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REVISION OF THE SAPOTACEAE OF THE MALAYSIAN AREA IN A WIDER SENSE.

Under this general title the Sapotaceae of the Malaysian area will be gradually revised. These revisions are to be considered justificative preparations to definite but concise publications in the 'Flora Malesiana', in the same way as the papers by Dr C. A. Backer c.s. (Blumea 1938 — hodie) are elaborate precursors to his 'Flora of Java'. The Burseraceae will be dealt with in a similar way.

Unless the presence of flowers and/or fruits is mentioned, the specimens quoted are sterile.

I. A MONOGRAPH OF THE GENUS ISONANDRA

by
M. JEUKEN S. J.
(The Hague)

(Issued 15. V. 1952).

> "We have all along considered it as trifling with nature to separate species on slight or variable grounds, nor could we ever understand the "*cui bono*" for which so much ingenuity in splitting hairs has been wasted".
>
> R. Wight and G. A. Walker—Arnott, Prodromus Florae Peninsulae Indiae Orientalis, 1834, p. XXI.

Introduction.

At the instigation of the Director of the "Rijksherbarium" at Leiden, Prof. Dr H. J. Lam, who was puzzled by the problem of the delimitation of the genus *Isonandra* towards other genera, especially *Palaquium*, I assumed the task to compose a monograph of *Isonandra*. For this study material was kindly put at our disposal by the directors of several institutes, which enabled me to check up the type-specimens of all species, except that of *Isonandra emarginata* H. J. Lam, which failed to turn up even at Singapore and at Borneo. However, the *Isonandra*-character of this species is doubtful: it is more like *Palaquium*.

It is my pleasant duty to express my sincere thanks to the directors of the institutes mentioned underneath, for their valuable cooperation. Our thanks also due to Mr T. P. Nedungadi, M. A. of the Embassy of India at The Hague, whose kind intermediary enabled me to consult detailed maps of India and Ceylon.

The abbreviations proposed by Lanjouw and used in the enumeration of the specimens in this paper have been added between brackets:

Bogor, Herbarium Bogoriense, Kebun Raya Indonesia (BO).
Calcutta, The Royal Botanic Garden and Herbarium (CAL).
Edinburgh, Royal Botanic Garden (E).
Genève, Institut de Botanique Systématique de l'Université (G).
Glasgow, Botanical Dept. Herbarium, The University (GL).
Jamaica Plain (Mass.), Arnold Arboretum of Harvard University (A).
Kew, Herbarium, Royal Botanic Gardens (K).
Leiden, Rijksherbarium (L).
New York, New York Botanical Garden (NY).
Paris, Muséum National d'Histoire Naturelle, Phanérogamie (P).
Singapore, Straits Settlements, Botanic Gardens (SING).
Stockholm, Naturhistoriska Riksmuseet (S).
Utrecht, Botanisch Museum en Herbarium (U).
Washington (D. C.), U. S. National Herbarium, Smithsonian Institution (US).

Historical Notes.

The genus *Isonandra* has been created by R. Wight in his Icones Plantarum (1840). He established it for specimens from the Deccan Peninsula and distinguished the genus from others with the following remarks:

> "This genus is readily distinguished from all others of the order by its perfectly symetrical flowers, and the stamens all perfect (hence the name) in place of one half sterile. In habit and also in structure, it is allied to *Sideroxylon*, but the quaternary, not quinary, arrangement of the flowers and the absence of abortive stamens in any form, sufficiently separate them." (Ic. Pl. II, in explanation of plates 359 and 360.)

As species *I. lanceolata* and *I. villosa* were mentioned. In Ic. Pl. IV *I. perrottetiana* DC and *I. candolleana* Wight were added (tab. 1219 and 1220).

The quaternary arrangement of the flower was accepted as one of the principal characteristics of *Isonandra*. Also A. De Candolle (Prod. VIII, 1844, 187) stresses the quaternary number. He is the intellectual father of *I. perrottetiana* and *I. wightiana*.

G. H. K. Thwaites (En. Pl. Zeyl., 1864, 176) makes a distinction between two sections: the first having a "calyx 6-partitus", the second "calyx 4-partitus". The first section coincides with *Palaquium*, a name which is not used by Thwaites, in the second he combines all the species known from Ceylon in *I. wightiana*, recognizing two varieties; var. *angustata* and var. *montana*. Regarding this lumping mentioned more will be said underneath.

C. B. Clarke (in Hooker, Fl. Brit. Ind. III, 1882, 538) enumerates all the species mentioned by the earlier authors, adding *I. stocksii*.

G. King and J. S. Gamble (Journ. As. Soc. Beng. LXXIV, 1906, 165) added *I. perakensis* and the doubtful *I. rufa*, both species from the Malay Peninsula.

In 1909 M. Dubard was the first to give a survey of *Isonandra* in Deccan and Ceylon ("Sur les Isonandra des Indes orientales", Bull. Mus. Nation. d'Hist. Nat., XV, 27—30; also in: Rev. Gén. de Bot. 21, 1909, 392—393).

As has been done by previous authors, Dubard also stresses the 4-merous flower-whorls as the primary characteristic:

> "Le genre *Isonandra*, créé par Wight, pour des espèces des Indes orientales, est très bien défini par les caractères floraux. La fleur est construite sur le type 4 et le nombre des pièces des verticilles offre une constance presque parfaite." (l. c. 27.)

However, it is added:

> "L'ovaire est généralement à 4 loges opposées aux lobes du calice, quoique ce nombre s'élève parfois à 5." (ibid.)

The following species are distinguished by Dubard:

I. lanceolata Wight. With this species *I. wightiana* DC. and some varieties were combined.
I. compta Dub. (Syn.: *I. wightiana* DC. var. *compta* Thw.).
I. perrottetiana DC., according to Dubard identical with *I. candolleana* Wight.
I. alphonseana Dub. A new species of Dubard, which he assumes to be the same as pictured in Ic. Pl. 1219 (*I. perrottetiana* Wight not of DC.). In this way an error of Wight's was considered corrected. As will be pointed out later on, the contrary is true: an error of Dubard's has been created!
I. villosa Wight.
I. stocksii Clarke.
(*I. diplostemon* Clarke. This species, as Dubard rightly remarks, cannot be maintained as *Isonandra*. It is the same as *Diospyros obovata* Wight, Ic. Pl. 1226. Cf. the present mon. p. 577).

Regarding the problem of *I. alphonseana* Dub. we may refer to our discussion under *I. perrottetiana* DC. and the solution proposed there.

Dubard's observation of the quinary ovary is valuable. However, already Wight himself indicated the appearance of the quinary number in certain whorls of the flower. In Ic. 1220 (*I. candolleana*) an ovary with 5 cells is pictured and, in addition, a flower with 5 petals. Yet, it seems that Wight considered these phenomena exceptions, since he never directly stressed them: his description merely states: "corolla deeply 4 cleft".

Accordingly, it was generally accepted for a long time, that the quaternary number of the flower parts of *Isonandra* was a trustworthy character to separate the genus from *Palaquium*, which is generally 6-merous. In addition, the latter genus was distinguished by its generally larger leaves and longer pedicels, and the albuminous seed. However, in the course of time specimens were discovered in which the quaternary number was not always constant. This made the difference between the two genera more and more vague and this point has been given due attention in the present study.

The first who tried to give a solution was L. Pierre, who around 1890 created the section *Coronisia* as a transitional group. This section was never stressed, however; it was only cursorily mentioned in his "Notes Botaniques", p. 8: In connection with *Galactoxylon*, which shows a tendency towards *Palaquium*, Pierre observes:

> "Je n'ai pas parlé à dessein du nombre des parties, qui se présente, chez le *Palaquium*, assez variable. J'ai établi, en effet, une section *Coronisia* pour quelques espèces ayant 4—5 sépales, 4—5—7 pétales et 10—14 étamines tenant à la fois de l'*Isonandra* et du *Palaquium*."

Chiefly the name *Coronisia* may be found as a generic name on his herbarium labels in Beccari's Borneo material, and in the extensive, almost illegible, notes accompanying them. Several of these notes have been used by Dubard, who proposed three groups: *Isonandra* proper, *Palaquium* without albuminous seed, and *Palaquium* with albumen:

> "Tous les caractères floraux (de *Palaquium Edenii* Pierre mss., M. J.) sont ceux d'un *Palaquium*, et cependant la graine jeune présente un albumen parfaitement développé renfermant vers son sommet un embryon petit mais bien différencié, avec cotylédons et radicule très distincts. Cette plante ne diffère plus alors d'un *Isonandra* que par le nombre des parties de la fleur. Si les graines de tous les *Palaquium* décrits étaient parfaitement connues, il est probable qu'on pourait relever la présence d'un albumen chez un certain nombre d'entre elles: il y aurait alors lieu de séparer en un groupe spécial ces *Palaquium* albuminés formant transition naturelle entre les *Isonandra* et les *Palaquium* dépourvus d'albumen. Il conviendrait alors ou de créer un genre intermédiaire pour les *Palaquium* albuminés ou de fondre en un seul genre les *Palaquium* et les *Isonandra* en y pratiquant 3 sections correspondant respectivement aux *Isonandra*, aux *Palaquium* albuminés et aux *Palaquium* dépourvus d'albumen." (Bull. Soc. Bot. de France, Mém. 16, 1909, 22).

In the Rev. Gén. Bot., 21, 1909, 398, however, Dubard foresees a possible combination of the two genera:

> "En résumé, ce groupe des *Isonandrées* ne renferme que deux genres bien définis: les *Isonandra* et les *Palaquium* différant par le nombre des parties de la fleur et par la présence ou l'absence, d'albumen dans la graine; mais, comme nous l'avons constaté, ces caractères ne sont peut-être pas aussi tranchés qu'il semble au premier examen; certaines *Palaquium* paraissent pourvus d'un albumen, d'autres présentent certaines réductions dans le type floral; dès lors, la limite entre les deux genres devient moins nette et il n'est pas impossible qu'on soit amené plus tard à les combiner entre eux."

As will be shown underneath, the present study proposes to maintain the separation of the two genera.

Independently from the researches of Pierre, H. J. Lam in 1925—1927 examined specimens from Borneo, describing some of them as new species, viz. *I. gracilis*, *I. emarginata*, and *I. borneensis*. The former two, however, appeared to be conspecific with Pierre's *Coronisia* species: *C. beccariana* Pierre (ined.) is identical with *I. gracilis* H. J. Lam; and *C. multiflora* Pierre (ined.), afterwards published by Dubard as *Palaquium multiflorum* Pierre, seems to be identical with *I. emarginata* H. J. Lam, the publication of Dubard having priority. (Cf. the present mon. p. 578).

Meanwhile, Gamble in his Flora of the Presidency of Madras, IV, 1921, 760, stated once more the 4-merous flowers, ignoring the deviations. His new species, *I. montana* Gamble, however, does not occur in Madras, but only in Ceylon (cf. p. 572).

In 1938 Ch. Baehni published in Candollea VII his: "Mémoires sur les Sapotacées", but his attention was not particularly directed to *Isonandra*. He is inclined to combine *Isonandra* with *Madhuca* (l. c. 451 and 473). This is not the place to discuss the matter: we may refer to the reaction to his ideas by Lam in 1939 (Rec. trav. bot. Néerl. XXXVI, 1939, 509 ss.). Lam maintains *Isonandra* as a separate genus. Whether this is correct, is to be decided by an investigator who is able to survey the whole family and familiar with its structure. Yet, Baehni's publication has greatly stimulated our interest in the problems connected, such as the genus problem in general, the limitation of species etc. This is of some importance to the present monograph, since it means a considerable help in giving shape to our opinion concerning the delimitation of the genus and its species and showed the way to disentangle the "*Isonandra*-problem".

In contradiction to Baehni's opinion, who assumes only the individual as a reality, and to whom the genus and species merely are abstract and therefore subjective notions, it is my opinion, that both genus and species — as, in fact, all taxa — are realities in this sense that they are limited by natural discontinuities rather than by human concepts.

The delimitation of the genus.

When we find transitions between taxa which till nowadays were considered different groups, we can in some cases include them all into one and the same taxon, but in others the number of transitions is insignificant in comparing that of the groups they connect. The point is whether their proportion allows a taxonomic distinction between the main groups, or whether the number of transitions is so large that such a distinction is not justified.

This is what we have to find out in the case of *Isonandra.* There are undubitable transitions between this genus and *Palaquium.* Pierre, Dubard and Lam directed the attention to them. The questions arise: is *Isonandra* to be maintained as a separate genus or is it to be inserted in *Palaquium*; and if so, as a section? Or have certain *Isonandra* species to be kept separate as a section, either of *Isonandra* or of *Palaquium*?

The result arrived at in the present paper is, that *Isonandra* should be maintained as a separate genus. There are too many differences between *Palaquium* and *Isonandra* than that a combination of the two would be justified. *Isonandra* is to be distinguished from *Palaquium* by its generally smaller leaves, its sessile or short-pedicelled small flowers, and its albuminous seed. Moreover, the flowers are never 6-merous, but 4—5 merous, and the anthers and style are hardly protruding from the corolla.

Yet, the close relationship between the two genera is unmistakable. Some *Palaquium* species have albuminous seeds e. g. *P. edenii* (Pierre) Dubard (Mém. 16, p. 22; Rev. Gén. p. 397) and *P. walsurifolium* (Pierre) Dubard (ibid.). Other *Palaquium* species are not constantly 6-merous: *P. multiflorum* (Pierre) Dubard (Mém. 16, p. 23), 5—6—7 merous; *P. crassifolium* (Pierre) Dubard (ibid.), 4—6 merous; *P. ridleyi* King and Gamble, emend. H. J. Lam mss., 4—6 merous and most probably with albuminous seed; *P. galactoxylon* (Müller) (Bentham and Hooker) H. J. Lam (Bull., 1925, 107), 5—6 merous, cf. Pierre, Not. bot., 1890, 6; Dubard, Rev. Gén. 1909, p. 397.

The transitional species are chiefly from Malaysia, especially from Borneo. *P. galactoxylon* is a native of N. Queensland.

This means that *Isonandra* is centred in India, Ceylon and western Malaysia, whilst Borneo may be considered the (taxonomically) transitional area.

The delimitation and distribution of the species.

The same problem returns in the delimitation of the species. The genus *Isonandra* as we see it, appears to us as highly variable. We observe in the material transitional forms between species which once were considered well distinct. These transitions have also been stated by others, e. g.:

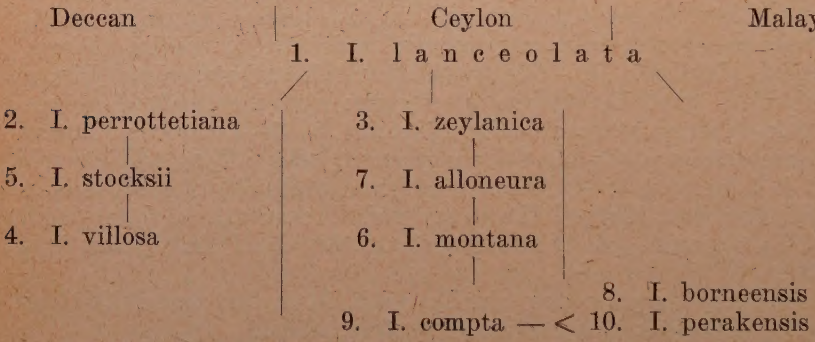
Thwaites (l. c. 178): "I was at one time disposed to regard some of the forms of this most variable plant (*I. wightiana* DC., M. J.) as distinct, but further observation and the examination of a large number of specimens, satisfy me that they all belong to one species. I have little doubt, too, that Dr. Wight's *Is. lanceolata* is a form of the present plant, for I have examples of it extremely like his figure."

Beddome (For. Man. Bot., 1869, 141): "This tree (*Bassia wightiana* DC. syn. *Isonandra*, M. J.) is most abundant throughout our western forests and in Ceylon, from somewhat below 2000 feet elevation up to 6000; it is most variable in its foliage, but with many observation I have no hesitation, (as proposed by Dr. Thwaites,) in uniting all Dr. Wight's species; in fact they run so one into another that they cannot be classed as varieties, except perhaps the form with the leaves fulvo-tomentose beneath (*I. compta* Dub. ?, M. J.), which is rare (only observed by me on the Tinnevelly mountains), but this form has the leaves sometimes lanceolate."

Clarke (l. c. 538): "In the opinion of Thwaites and Beddome, who are well acquanted with this genus in the field, all the Indian species of Wight and A. DC. are varieties of one."

Thus, these authors are inclined to unite all species they were acquainted with. In the present paper I have tried to recheck this opinion and to test the value of the concentration points of certain characters. As has already been stated by previous authors (e. g. Dubard, Lam, Baehni), an important character is found in the tertiary nervation. It is our impression that this holds true, at least for *Isonandra*, in which we found it of primary importance. Another valuable feature is the acuminate leaf-tip. Regarding the flowers we did not find essential differences, e. g. it is true that the pilose anther-tips, a point greatly stressed by Dubard, are most conspicuous in *I. perrottetiana* DC., but they are not absent in the other species. Therefore, the main character used in the key, is the shape of the leaves and the nervation.

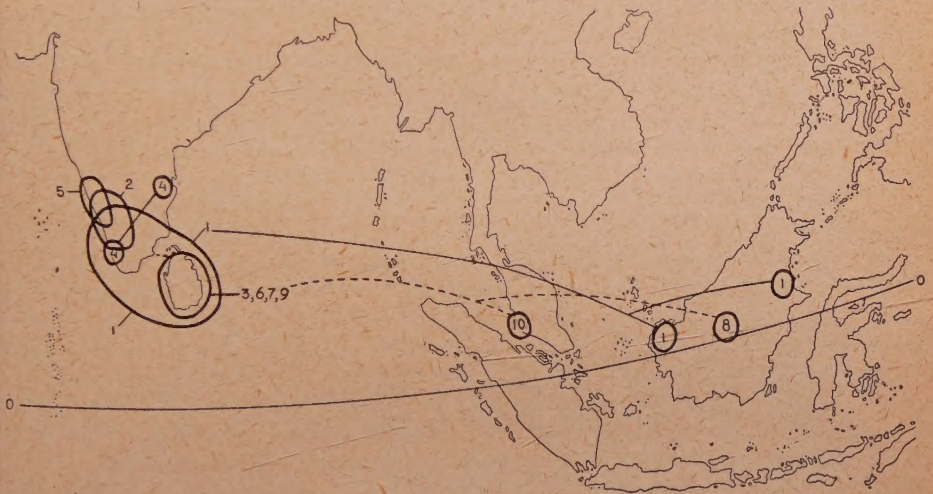
The interrelation of the *Isonandra* species may perhaps be indicated as follows:



In the above statement (see *Map 1*) all known species are mentioned. *I. lanceolata* is the only one represented in all three regions. The Ceylon species *I. compta* seems closely related to *I. perakensis* from Perak and to *I. borneensis* from Borneo. As is well known, relations between the flora's of Ceylon and Malaysia — rather than with that of India — are not unusual.

Discussion.

We must here make a remark about the numbering of the plants in the different collections. As an example we take the herbarium of Wight, who has himself numbered his plants. It turned out, that these numbers do not indicate that the specimens were taken from the same tree: they are nothing but numbers in a catalogue. It is therefore possible — indeed, it is often found — that plants bearing the same number in the herbaria of, say, Kew, Paris and Leiden, really hail from different trees, and possibly are even representing different species. The case of Wight's expedition, of which the plants (no *Isonandra*) were distributed in 1832—1833, and of which the results are laid down in Wight-Arnott's Prodromus, shows the method of Wight's numbering: the Prodromus enumerates the plants "arranged according to the natural system". The numbers of the Wight specimens increase practically regularly from No. 1 to 1375. Since, of course, it is very improbable that Wight has collected his plants in the sequence of a natural system, the logical conclusion must be that the numbers are those of a catalogue, added to the specimens when at home, not numbers given to them in the field. These numbers are indicated in the Prodromus as: "cat. n. ...".



Map 1. Areas of *Isonandra* species — 1. *lanceolata*; 2. *perrottetiana*; 3. *zeylanica*; 4. *villosa*; 5. *stocksii*; 6. *montana*; 7. *alloneura*; 8. *borneensis*; 9. *compta*; 10. *perakensis*.

This method is also used by Wight in the following period, of which, however, no catalogue was published. In this period also *Isonandra* was collected. The *Isonandra* specimens are numbered (on the labels): 1732, 1733, 1734, etc. Under No. 1735 we find two plants, one from Valla Candoo December 1850, the other from Cochin April 1849.

The same must be said of the Ceylon plants collected by Thwaites; as an example we take C. P. (Ceylon Plants) 45. Various and different specimens bear this number, and on comparing the dates of collection, we feel sure, that the specimens must be from different trees. We have found the years 1853, 1854, 1863, 1864, 1866, etc., as the year of collection, all under the same number C. P. 45.

Warned and taught by these facts, we have paid no heed to this kind of numbers, but only to the characters of the specimens. Still, of course, the same numbers often indicate the same species, but this is to be considered mere coincidence.

So as to avoid confusion and to enable a right indication of the sheets examined by me, I have provided every sheet with a Monograph Number (*Mon. Nr.* ...), which is mentioned in the enumeration of the sheets. I omitted all invaluable numbers. In the last-named cases, which are frequent, the Monograph Number should be considered the official indication.

A confirmation of these experiences about the numbering of plants was found in a paper by C. B. Clarke, entitled "Collector's numbers" (Journal of Botany, 1893, 135—138), to which my attention was kindly drawn by Dr H. C. D. de Wit. The paragraph concerned reads as follows:

> "...It is supposed that each collector affixes his fieldnumbers continuously, during his whole life, not repeating any number twice; that he places the same number on all the pieces cut from one tree or shrub; and that, in regard to small plants, he affixes the same number to a series of these only when, from their being collected at the same time and place, he feels morally certain that they are all one species and one form....
>
> But unfortunately, while many of the best collections, as Balansa, Mandon, Curtiss (sic!, M. J.), Thwaites, are properly numbered, the majority of collections, especially the European collections are not....
>
> The worst of all plans is that adopted by Wallich and by many modern European collectors. In this plan a quantity of material from various localities is got together; it is the sorted into genera, then into species; all the material of one (supposed or estimated) species is well mixed, and then issued under one number. If a sheet of this kind has to be named, it is necessary to examine every scrap on the sheet (a tedious waste of time). If the happens that several species (or varieties, or even "forms") are mixed under the number, it is useless for citation. The numbers of Wallich, as to the "type" sheet in his large paper collection, are cited sometimes in the *Flora of British India*; but the chief value of such citations is to direct a person in London where to go to see the "type" of the species described. It is not at all safe to name Wallich's sheets at Calcutta from such citations......"

Regarding the proper numbering of the collection of Thwaites, however, I think I may have also reason to doubt the value of his numbers, as I have pointed out above.

Another note may be made regarding the localities. It is my impression, that sometimes on old sheets the locality is written in an uncritical manner: it may be suspected that, after the determination of the plants, the locality indicated in the litterature has been added, e. g. in the three sheets 1837 No. 2148 (GL), *I. lanceolata,* with the locality: Quilon. (*Mon. Nr. 25, 26, 27*). It is, however, impossible to verify this.

The descriptions are all given in Latin. Most of them are emendated descriptions. Whenever it was deemed useful, descriptions of the "type" specimens of the species accepted, and of the principal synonyms are added.

ISONANDRA.

Isonandra Wight, Ic. Pl. II, 1840, tab. 359, 360 and IV, 1850, tab. 1219, 1220; A. De Candolle, Prodr. VIII, 1844, 187; Wight's Indian Botany, II, 1850, tab. 148-b. B (except the 6-celled ovary); Walpers, Ann. Bot. Syst. I, 1850, 496; Miquel, Flora van Ned. Indië II, 4, 1857, 1037; Dalzell and Gibson, Bombay Flora, 1861, 139; Thwaites, Enum. Pl. Zeyl., 1864, 176; Beddome, For. Man. Bot., 1869, 141; Eichler, Blüthendiagramme I, 1875, 332; Bentham and Hooker, Gen. Pl. II, 1876, 657; Kurz, For. Fl. Br. Burma II, 1877, 119; Hartog, Journ. of Bot. 1878, 69; Radlkofer, Sitzungsber. Bair. Akad. Wiss., 1881, 305; Clarke in Hooker, Fl. Brit. Ind. III, 1882, 538; Burck, Ann. Jard. Bot. Buit. V, 1886, 20; Radlkofer in Durand, Index Gen. Phan., 1888, 256; Engler, Bot. Jahrb., 1890, 496 ss, passim;

Pierre, Notes Bot., 1890, 8; Boerlage, Handl. Fl. Ned. Ind. II, 1, 1891, 302; Baillon, Hist. d. Pl. XI, 1892, 301; Trimen, Fl. Ceyl. III, 1895, 77; Engler-Prantl, Nat. Pfl. fam. IV, 1, 1897, 134 and 127, fig. 67 H; King and Gamble, Journ. As. Soc. Beng. 74, 1906, 165; Cooke, Fl. Bomb. II, 1908, 91; Dubard, Bull. Mus. Nation. Hist. Nat. XV, 1909, 27; Rev. Gén. Bot. 21, 1909, 392; Bull. Soc. Bot. Fr., Mém. 16, 1909, 21; Gamble, Fl. Madr. IV, 1921, 760; Ridley, Fl. Mal. Pen. II, 1923, 260; Lam, Bull. Jard. Bot. Buit., Sér. III, Vol. VII, 1—2, 1925, 108 et 258 and Vol. VIII, 4, 1927, 418; Baehni, Candollea VII, 1938, 451; Lam, Rec. Trav. Bot. Néerl. XXXVI, 1939, 520.

Several *Palaquium* species (formerly *Dichopsis*) were originally described as *Isonandra*. For this (and other) synonymy we may refer to the species dealt with in this study, and to the list of *Isonandra* names given at the end. For the bibliography regarding these species, cf. Lam, Bull. Jard. Bot. Buit., ll. cc.

Arbores parvae vel mediocres, lactescentes; *ramuli* teretes, 0.25—0.7 cm in diam.; *stipulae* parvae, mox deciduae; *folia* coriacea generatim parva (usque ad 15 cm longa), plerumque ad apices ramulorum conferta, penninvenia, nervis secundariis ante marginem folii deflectentibus et nonnumquam furcatis, in nervum intramarginalem confluentibus; nervi tertiarii inter sese transversaliter paralleli aut reticulati aut transversaliter vel longitudinaliter reticulati; *inflorescentiae* in axillis foliorum, aliquando caducorum et tunc juxta ramulos, insertae, saepe pluriflorae, floribus sessilibus vel breviter pedicellatis, pedicello cum sepalis extus ferrugineo-pubescentibus; *sepala* 4—5 biseriata, calyci subaequilonga, exteriora generatim paulo majora interioribus, obtuse deltoidea vel oblonga, plerumque 0.2—0.4 cm alta; *corolla* 4—5-loba generatim glabra, lobis imbricatis; *stamina* 8—10, plerumque 8, subaequalia quasi uniserialia fauce infixa, in alabastro 4 epipetalia 4 alternipetalibus longiora, filamentis vittaeformibus; antherae dorsifixae extrorsae, haud vel vix e corolla exsertae, glabrae vel, praesertim in apice, pilosae; staminodia nulla; *ovarium* hispidum conoideum in stylum cylindricum glabrum contractum, vix vel paulo e corolla exsertum, 4—5-loculare, loculis 1-ovulatis, episepalibus¹), ovulis anatropis axis centralis apice insertis, epitropis; *fructus* baccati, oblongi vel rotundati, glabri, monospermi, styli rudimento coronati; *seminis* cicatrix longa angusta, testa crustacea, salva cicatrice, nitida; embryo albuminosum, cotyledones planas includens; radicula longa cylindrica exserta.

10 species in Deccan, Ceylon, the Malay Peninsula and Borneo.

The species from the Sandwich Islands, mentioned by Bentham and Hooker, l. c. 1876, 658: “Huc etiam pertinere videtur species in ins. Sandvicensibus ab Hillebrandtio lecta” is not *Isonandra*, but *Nesoluma polynesicum* (Hillebr.) H. Baillon. Cf. Hillebrand, Fl. Haw. Isl., 1888, 277; Baillon, o. c. 1892, 279; Lam and Meeuse, Occ. Pap. Bish. Mus. XIV, 9, 1938 (Monograph of the Genus Nesoluma).

Type species: *Isonandra lanceolata* Wight.

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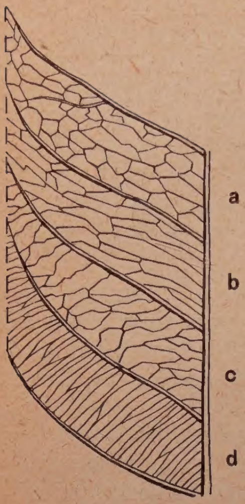
¹) Observation in *I. perrottetiana* DC., lecto-type, *Mon. Nr. 165* cf. p. 564.



Regarding the nervation, the following terminology is used in the key:

The midrib of the leaves is called the primary nerve, etc.

For the tertiary nerves distinction is made between 4 types:

a. reticulate (neither transversally nor longitudinally), e.g. *I. montana* Gamble.

b. longitudinally reticulate (nerves not closely together, somewhat ascending and passing into reticulation), e.g. *I. alloneura* Jeuken.

c. transversally reticulate (nerves not closely together, descending, passing into reticulation), e.g. *I. stocksii* Clarke.

d. transversally parallel (nerves closely together, mutually parallel), e.g. *I. lanceolata* Wight.

Key to the species.

1.a. Leaves glabrous on both sides, or sparsely tomentose beneath 2
b. Leaves densely tomentose beneath 13
2.a. Tertiary nerves transversally parallel, conspicuous 3
b. Tertiary nerves not transversally parallel or inconspicuous 7
3.a. Leaf-tip acuminate; tertiary nerves generally perpendicular to the midrib, near the margin a little descending, sometimes more perpendicular to the secundary nerves . . . . 1. **I. lanceolata** Wight, s.l., p. 557
b. Leaf-tip rounded, or more or less acute, not conspicuously acuminate . . . 4
4.a. Leaves narrowly ovate to lanceolate, 4—10 × 1—2.5 cm, cuneate at base, tertiary nerves with a tendency to reticulation 1. **I. lanceolata** Wight, f. **angustata**, p. 559
b. Leaves elliptical to oblong, sometimes obovate, or orbicular 5
5.a. Leaves orbicular, shortly acuminate, 2—4 × 1.5—2.5 cm, secondary nerves 4—5 1. **I. lanceolata** Wight, f. **rotunda**, p. 560
b. Leaves not orbicular, larger 6
6.a. Leaves elliptical to oblong, sometimes obovate, generally not acuminate, 3—10 × 1.5—4.5 cm, tertiary nerves near the midrib perpendicular to it, for the rest more so to the secondary nerves; petiole 0.5—1.0 cm, anthers pilose, fruit oblong, Deccan . . . . 2. **I. perrottetiana** DC., p. 563
b. Leaves obovate, shortly acuminate, 6—10 × 2—4.7 cm, tertiary nerves perpendicular to the midrib, for the rest slightly descending; petiole 1.3—1.5 cm, anthers glabrous, fruit globose, Borneo 1. **I. lanceolata** Wight, var. **gracilis**, p. 561
7.a. Leaf-tip long acuminate (about 1 cm), tertiary nerves transversally reticulate; sepals oblong . . . . 3. **I. zeylanica** Jeuken, p. 567
b. Leaf-tip rounded or shortly acuminate 8
8.a. Leaves narrowly ovate to lanceolate, 4—10 × 1—2.5 cm, cuneate at base, tertiary nerves transversally-parallel with a tendency to reticulation 1. **I. lanceolata** Wight, f. **angustata**, p. 559
b. Leaves obovate or elliptical to oblong 9
9.a. Tertiary nerves transversal or inconspicuous 10
b. Tertiary nerves reticulate or longitudinally reticulate 12
10.a. Leaves elliptical to oblong, sometimes obovate, 3—10 × 1.5—4.5 cm, tertiary nerves mutually parallel with a tendency to reticulation, inflorescences not on thick dwarf shoots in the axils of fallen leaves; anthers pilose 2. **I. perrottetiana** DC., p. 563

b. Leaves obovate, inflorescences sessile on short thick dwarf shoots in the axils of fallen leaves 11

11.a. Leaves broadly obovate, 4—11 × 3—6 cm, rounded to obtuse at either end, waxy especially at the underside, secondary nerves 11—15, tertiary nerves not closely together, parallel with a tendency to reticulation, sometimes inconspicuous 4. **I. villosa** Wight, p. 568

b. Leaves obovate, 7—12 × 3—6 cm, obtuse at tip, not waxy but dark brownish when dry, secondary nerves 8—10, tertiary nerves transversally reticulate 5. **I. stocksii** Clarke, p. 570

12.a. Leaves small, 4—6 × 2—3 cm, broad at tip, obovate, acute at base, lowerside yellowish-brown when dry, secondary nerves 5—7, ascending from the midrib at an angle of about 45°—60°, tertiary nerves reticulate, ovary nearly glabrous 6. **I. montana** Gamble, p. 571

b. Leaves 6—8 × 2.5—4 cm, leaf-tip shortly and bluntly acuminate, secondary nerves 6—7, ascending from the midrib at an angle of about 55°—60°, tertiary nerves longitudinally reticulate . . . . 7. **I. alloneura** Jeuken, p. 572

13.a. Tertiary nerves transversally parallel, leaves small, 2—5.8 × 1.2—3.2 cm, obovate, acute at base, rounded or shortly acuminate at tip; secondary nerves about 11; flowers small, 0.2 cm long . . . . . 8. **I. borneensis** H. J. Lam, p. 574

b. Tertiary nerves inconspicuous or more or less longitudinally reticulate, secondary nerves 7—10 14

14.a. Leaves glossy beneath, spathulate to oblong, shortly acuminate, secondary nerves 7—8; flowers subsessile, sepals 0.3 cm long, tertiary nerves more or less longitudinally reticulate . . . . 9. **I. compta** Dubard, p. 574

b. Leaves dull, elliptical to oblong, blunt at tip, secondary nerves 8—10, tertiary nerves inconspicuous, sepals 0.25—0.3 cm long 10. **I. perakensis** King and Gamble, p. 577

1. **Isonandra lanceolata** (not of Thwaites) Wight, (type-species), Ic. Pl. II, 1840, tab. 359; A. De Candolle, Prodr. VIII, 1844, 187; Clarke in Hooker, Fl. Brit. Ind. III, 1882, 539; Trimen, Fl. Ceyl. III, 1895, 77; Engler-Prantl, Nat. Pfl. fam. IV, 1, 1897, 132, fig. 69, U, V; Dubard, Bull. Mus. Hist. Nat. XV, 1909, 27; Rev. Gén. Bot. 21, 1909, 393 and 392, fig. 1; Gamble, Fl. Madr. IV, 1921, 761; Lam, Bull. Jard. Bot. Buit., Sér. III, Vol. VII, 1—2, 1925, 110 et 259 and Vol. VIII, 4, 1927, 421; Baehni, Candollea VII, 1938, 451 — *I. wightiana* DC., Prodr. VIII, 1844, 187; Thwaites, Enum. Pl. Zeyl., 1864, 177; Clarke, l. c., 1882, 539; Trimen, l. c., 1895, 77; Dubard, Bull. Mus. Hist. Nat. XV, 1909, 27 — *I. wightiana* DC. (resp. *I. lanceolata* Wight) var. *angustata* Thwaites, Enum. Pl. Zeyl., 1864, 177; Clarke, l. c., 1882, 540; Trimen, l. c., 1895, 78; Dubard, Bull., 1909, 28 — *I. wightiana* DC. forma *foliis longis acuminatissimis*, auct. ign., in schedula, 1866 — *Bassia wightiana* DC., ex Beddome, For. Man. Bot., 1870, 141 — *I. lanceolata* Wight var. *anfractuosa* Clarke, l. c., 1882, 539; Gamble, l. c., 1921, 761 — *I. wightiana* DC. (resp. *I. lanceolata* Wight) var. *major* Clarke, l. c., 1882, 539; Trimen, l. c., 1895, 78 — *I. wightiana* DC. var. *acuminata* (Gardner mss.) Clarke, l. c., 1882, 540; Dubard, Bull., 1909, 28 — *Palaquium beccarianum* Pierre, in schedula, between 1872 and 1890 — *I. gracilis* H. J. Lam, Bull. Jard. Bot. Buit., Vol. VIII, 4, 1927, 418 and 419, fig. 7 — *I. lanceolaria* Wight, in schedulis (= *I. lanceolata* Wight var. *anfractuosa* Clarke).

Synonyma excludenda: *Sideroxylon tomentosum* Roxb., Pl. Cor. I, 1795, 28; A. De Candolle, l. c., 1844, 188; Clarke, l. c., 1882, 539 (=*Planchonella tomentosa* [Roxb.] Pierre, Not. Bot., 1890, 36) — *Sideroxylon wightianum* Wall., cat. No. 4154 in A. De Candolle, l. c., 1844, 188; Clarke, l. c., 1882, 539; Index Kew. (= *Planchonella tomentosa* [Roxb.]

Pierre, Not. Bot., 1890, 36) — *Sideroxylon wightianum* Hook. and Arn., Bot. Beech. Voy., 1841, 196, tab. 41; Index Kew. (see the discussion, p. 563) — *I. perrottetiana* DC., cf. Thwaites, l. c., 1864, 177; Trimen, l. c., 1895, 77 (see p. 562) — *I. candolleana* Wight, cf. Thwaites, l. c., 1864, 177; Trimen, l. c., 1895, 77 (= *I. perrottetiana* DC.).

Varietates excludendae: *I. wightiana* DC. (resp. *I. lanceolata* Wight) var. *compta* (Thw.) Clarke (= *I. compta* [Thw.] Dubard) — *I. wightiana* DC. (resp. *I. lanceolata* Wight) var. *montana* Thw. (= *I. montana* Gamble).

Descriptio speciei emendata. — *Ramuli* teretes, glabri vel in imis apicibus minute ferrugineo-pubescentes; *folia* utrinque glabra vel subtus minute in costis pubescentia, breviter petiolata, petiolo usque ad 1.5 cm longo, oblongo- vel obovato-lanceolata, basi acuta vel attenuato-cuneata, apice obtuse acuminata; costa media subtus prominens; nervi secundarii 4—13, subtus prominentes, de costa angulo circiter 60° adscendentes, in nervum intramarginalem confluentes; nervi tertiarii permulti, tenuissimi, inter sese transversaliter paralleli, generatim costa media perpendiculares, prope marginem generatim leviter descendentes; *inflorescentiae* 2—10-florae in foliorum axillis insertae; *flores* breviter pedicellati, pedicellis circiter 0.2—0.7 cm longis; *sepala* 4—5, deltoidea, 0.2—0.3 cm longa, intus glabra; *corolla* glabra, 4-, interdum 5-loba, vix vel paulo e calyce exserta; *stamina* 8—10, circiter 0.2 cm longa; *antherae* glabrae vel paulo pilosae, circiter 0.1 cm longae; *ovarium* 4—5-loculatum, 0.1—0.2 cm altum; *fructus* oblongo-ovoidei vel globosi, *semina* 1—2 in fructu. — Deccan, Ceylon and Borneo. — *Fig. 1.*

Var. *α* **lanceolata.**

Descriptio variationis typicae emendata. — *Folia* utrinque glabra vel subtus minute in costis pubescentia, breviter petiolata, petiolo circiter 0.1 cm longo, ovali-oblonga vel oblongo-lanceolata, interdum obovata, basi acuta, apice obtuse acuminata, acumen 0.2—2 cm, generatim circiter 1 cm longum, magnitudine variabili, 2—23 cm longa, 1.5—10 cm lata; nervi secundarii 4—12; *inflorescentiae* 6—10-florae; pedicelli florum circiter 0.2—0.5 cm longi; *sepala* 4—5, circiter 0.3 cm longa; *corolla* 4-, interdum 5-loba; *stamina* 8, interdum 10; antherae glabrae vel paulo pilosae aut ad apicem aut ad basin aut in ambabus locis; *ovarium* 4—5-loculatum; fructus oblongo-ovoideus, 0.8—1.8 × 0.6—0.9 cm, *semen* 1 in fructu. — Deccan, Ceylon and Borneo.

Descriptio lecto-typi, *Herb. Wight No. 1732* (K), *Mon. Nr. 32* — *Ramuli* glabri, lenticellati; *folia* ad ramulorum apices conferta, utrinque glabra, oblongo-lanceolata, acumen 0.5—0.7 cm longum, supra fusca, subtus ferruginea, circiter 5—10 cm longa, 1.8—3 cm lata, petiolo 0.6—1.0 cm longo; nervi secundarii 5—9, paulo curvati, prope marginem maiori curvatione apicem folii versus juxta marginem currentes; *pedicelli* alabastrorum 0.25 cm longi, post anthesin usque ad fructum 0.5 cm; *sepala* 4 circiter 0.25 cm longa, intus glabra, obtuso-deltoidea; *corolla* 4-loba, 0.1 cm exserta; *stamina* 8; antherae apice acutae, glabrae attamen aliquando paulo pilosae, 0.1 cm longae, supra corollam non exsertae; *ovarium* 4-loculatum circiter 0.1 cm altum; stylus circiter 0.15 cm longus; *fructus* unicus styli rudimento coronatus, 1.0 cm longus, calyx persistens patens. — *Fig. 1a.*

Descriptio lecto-typi *I. wightianae* DC., in herb. Genève, cum inscriptione *Wallich Cat. 4153 C.*, 1829, *Mon. Nr. 52* — *Ramuli* glabri, lenticellati, in apice tantum minute ferrugineo-pubescentes; *folia* ad ramulorum apices conferta, utrinque glabra, ovali-oblonga, apice manifeste acuminata, acumine 0.5 cm longo, basi acuta, supra fusca, subtus ferruginea, circiter 6—10 cm longa, 3—5 cm lata, petiolo 0.7—1.0 cm longo; nervi secundarii 7—8; *inflorescentiae* circiter 6-florae; pedicelli alabastrorum 0.25 cm longi, post anthesin 0.3 cm; *sepala* 4 circiter 0.3 cm longa, intus glabra, obtuso-deltoidea; *corolla* glabra 0.2 cm supra calicem exserta, 4-loba; *stamina* 8, in alabastro epipetalia alternipetalibus longiora, per anthesin subaequalia e corolla non exserta; antherae paulo pilosae ad basin et forsan ad apicem; *fructus* et *semen* ignoti. — *Fig. 1b.*

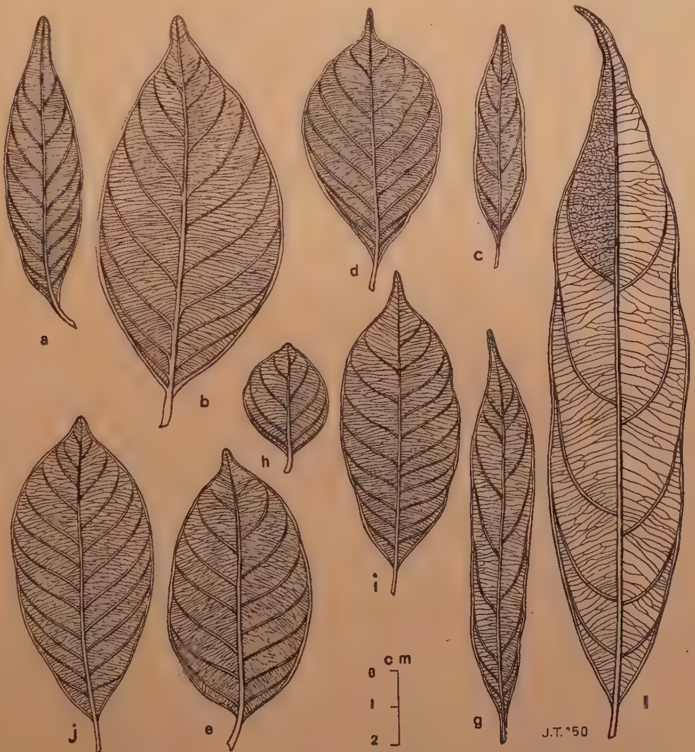


Fig. 1. *I. lanceolata.* Leaves of the varieties and forms — a. var. *α lanceolata,* Mon. Nr. 32 (type); b. *I. wightiana,* Mon. Nr. 52 (type); c. forma *angustata,* Mon. Nr. 113; d. forma *anfractuosa,* Mon. Nr. 17; e. forma *acuminata,* Mon. Nr. 69; f. forma *major,* Mon. Nr. 112; g. forma *acuminatissima,* Mon. Nr. 110; h. forma *rotunda,* Mon. Nr. 96; i. forma *borneensis,* Mon. Nr. 118; j. var. *β gracilis,* Mon. Nr. 120.

Formae distinguendae:

a. forma **angustata** (syn.: var. *angustata* Thw.): folia lanceolata, ab infra-medio apicem versus angustata, vix acuminata, 4—10 × 1—2.0 cm;

lamina subtus delicatule subparallelim venulosa. *Type Mon. Nr. 113.* — Ceylon. — *Fig. 1c.*

b. forma **anfractuosa** (syn.: var. *anfractuosa* Clarke): folia 7—20 × 4—10 cm, aliquando obovata, abrubte et subacute acuminata, acumine circiter 0.7—1.5 cm longo; nervi secundarii 8—12, subtus valde prominentes; nervi tertiarii generatim abrupte flexi et nervis secundariis perpendiculares; sepala magis acuta. *Type Mon. Nr. 17.* — Deccan. — *Fig. 1d.*

c. forma **acuminata** (syn.: var. *acuminata* [Gardner] Clarke): folia obovata, 5—10 × 2—5.3 cm, acumen 0.6—1 cm longum. *Type Mon. Nr. 69.* — Deccan, Ceylon. — *Fig. 1e.*

d. forma **major** (syn.: var. *major* Clarke): folia 15.5—23.5 × 3—4.5 cm; nervi secundarii 5—6, acumen 2 cm longum. *Type Mon. Nr. 112.* — Ceylon. — *Fig. 1f.*

e. forma **acuminatissima** (syn.: forma *foliis longis acuminatissimis,* auct. ign.): folia 11—19 × 1.7—2.4 cm, apice acuminatissima, acumine circiter 2 cm longo; basi attenuata; nervi secundarii 7—8. *Type Mon. Nr. 110.* — Ceylon. — *Fig. 1g.*

f. forma **rotunda** (f. nova): folia 2—4 × 1.5—2.5 cm, apice breviter acuminata, acumine 0.1 cm longo; nervi secundarii 4—5, fructus 0.8 × 0.6 cm. *Type Mon. Nr. 96.* — Ceylon. — *Fig. 1h.*

g. forma **borneensis** (f. nova): folia 6—10 × 2.3—4 cm, acumen 0.3—0.6 cm longum; nervi secundarii et tertiarii etiam supra prominentes, tertiarii irregulariter transversaliter paralleli. *Type Mon. Nr. 118.* — Borneo. — *Fig. 1i.*

DECCAN: Mont. Nilghiri and Kurg, *G. Thomson,* Herb. Lugd. Bat. 908225—179, fl., *Mon. Nr. 1* (L); *G. Thomson,* buds, *Mon. Nr. 2* (P); Wight, *Mon. Nr. 3,* and on same sheet: *Mon. Nr. 4* (P); *G. Thomson,* fl., *Mon. Nr. 5* (CAL); *G. Thomson,* fl., *Mon. Nr. 6* (K); *G. Thomson,* fl., *Mon. Nr. 257* (S); *G. Thomson,* 1861, fl., *Mon. Nr. 7* (G); fl., *Mon. Nr. 140* (K); Wynaad, Manantoddy, *M. A. Lawson,* fl., Oct. 1885, *Mon. Nr. 8* (K); South Malabar, Attapadi Hills, 3000 ft, *Fischer 2385,* fl., 31 Oct. 1910, *Mon. Nr. 9, f. anfractuosa,* (CAL); Coimbatore Dt., Izerpadi (? M. J.), *Barber 3821,* fl., 20 Oct. 1901, *Mon. Nr. 10,* f. *anfractuosa,* (CAL); Anamalai Hills, 4000 ft, *Beddome,* fl., *Mon. Nr. 11* and on same sheet: fl., *Mon. Nr. 12* (K); Monica, *Barber 3898,* fl. and fr., 29 Oct. 1901, *Mon. Nr. 13* (CAL); Valparai, *Barber 4000,* old fl., 8 Nov. 1901, *Mon. Nr. 14,* f. *anfractuosa,* (CAL); Lyerpadi, *Barber 5439,* fl., 22 April 1903, *Mon. Nr. 15,* f. *anfractuosa,* (CAL); Cochin, fl., April 1849, *Mon. Nr. 16,* f. *anfractuosa,* and on same sheet: Valla Candoo, fl., December 1850, *Mon. Nr. 17,* f. *anfractuosa, lecto-type* of *I. lanceolata* Wight, var. *anfractuosa* Clarke, ("Herb. Wight 1735, Isonandra lanceolaria Wt.") (K); Cooiloor, *M. Rama Rao 920,* fl., 22 Febr. '13, *Mon. Nr. 18* (CAL); Travancore, Peetmerd 3500 ft, *Bourdillon 187,* fr., 3 April '94, "a small tree, evergreen forests", *Mon. Nr. 19* (CAL); Travancore, *Bourdillon,* sine num., buds, *Mon. Nr. 20* (CAL); Merduston 2000 ft, *Bourdillon 597,* buds and fl., 2 April '95, " small tree, evergreen forests, moderate elevation", *Mon. Nr. 21* (K); Chiminujie 4000 ft, *Bourdillon 876,* old fl., 16 May '96, "a medium sized tree of the evergreen forests", *Mon. Nr. 22* (CAL); idem, *Mon. Nr. 23* (CAL); Shewagherry Hills, fr., Aug. 1836, *Mon. Nr. 24* (GL); Quilon, fl., Oct. 1835, *Mon. Nr. 25,* f. *acuminata,* (GL); Quilon, fl., Oct. 1835, *Mon. Nr. 26,* f. *anfractuosa,* (GL); Quilon, fl. and fr., Oct. 1835, *Mon. Nr. 27,* f. *anfractuosa,* (GL); Quilon, fr., June 1836, *Mon. Nr. 28* (K); Quilon, fl., Oct. 1835, *Mon. Nr. 29,* f. *anfractuosa,* (E); Quilon, *Gardner,* fl., *Mon. Nr. 30,* and on same sheet: Cochin, *Thustone,* fl., *Mon. Nr. 31* (K); Courtallum, ("Herb. Wight 1732"), fl., Aug. 1835, *Mon. Nr. 32, lecto-type,* (K); Bolimputty, fl., Nov. 1852, *Mon. Nr. 33,* f. *anfractuosa,* and on same sheet: Courtallum, fl., Aug. 1835, *Mon. Nr. 34,* f. *anfractuosa,* ("Herb. Wight 1735, Isonandra lanceolaria Wt"), (K); Courtallum, fl., Aug. 1835, *Mon. Nr. 35,* f. *anfractuosa,* and on same sheet: fl. and fr., *Mon. Nr. 36* (NY); Courtallum, fl., Aug. 1835, *Mon. Nr. 37* (GL); the same indication in: fl., *Mon. Nr. 38* (GL);

fl., *Mon. Nr. 39* (E); fl., *Mon. Nr. 40* (K); fl., *Mon. Nr. 41* (GL); fl. and fr., *Mon. Nr. 42* (GL); fl. and fr., *Mon. Nr. 43* (E); buds and fr., *Mon. Nr. 44*, f. *anfractuosa*, and on same sheet: fl., *Mon. Nr. 45* (E); fl., *Mon. Nr. 46* (CAL); fl. and fr., *Mon. Nr. 47* (CAL); fl., *Mon. Nr. 258*, f. *anfractuosa* (S); Malabar, fr. June 1836, *Mon. Nr. 48* and on same sheet: Courtallum, fl., Aug. 1835, *Mon. Nr. 49* (GL); Tinnevelly Dt., Kannikatti, *Barber 2979*, fl., May 1901, *Mon. Nr. 50* (CAL); idem, *Barber 2977*, fl. and fr., May 1901, *Mon. Nr. 51* (CAL); Unknown district: *Wallich*, 1829, Herb. Wight cat. n. 4153 C, ("*Sideroxylon tomentosum* Roxb."), fl., *Mon. Nr. 51, lecto-type* of *I. wightiana* DC. (G); 4154, *Sideroxylon wightianum* Wall. ("*Isonandra Wightiana* Alph. DC.", in the handwriting of DC), fl., *Mon. Nr. 53* (K); fl., *Mon. Nr. 54* (P); Herb. Lugd. Bat. 908.225—169, fl., *Mon. Nr. 55* (L); fl., *Mon. Nr. 56* (CAL); fl., *Mon. Nr. 57* (GL); Herb. Lugd. Bat. 908.225—146, fl., *Mon. Nr. 58*, f. *anfractuosa* (L); fl., *Mon. Nr. 59*, f. *anfractuosa* (P); fl., *Mon. Nr. 60* (G); *H. Heyn 4153*, fl., *Mon. Nr. 61* (CAL); fl. *Mon. Nr. 62* (CAL); fl. and fr., *Mon. Nr. 63*, f. *anfractuosa* (K); fl., *Mon. Nr. 64* (E); fl., *Mon. Nr. 65*, and on same sheet: fl., *Mon. Nr. 66*, f. *anfractuosa* (CAL); fl., *Mon. Nr. 67*, f. *anfractuosa*, and on same sheet: fl., *Mon. Nr. 68*, f. *anfractuosa*, (A).

CEYLON: *Gardner*, fl., *Mon. Nr. 69*, f. *acuminata*, *lecto-type* of *I. wightiana* DC. var. *acuminata* (Gardner) Clarke, (K); Colombo, *Mc. Reu*, fl., *Mon. Nr. 70*, f. *acuminata*, (K); old fl., *Mon. Nr. 71*, f. *acuminata*, and on same sheet: *Col. Walker, Sir W. J. Hooker* 1838, fl. and fr., *Mon. Nr. 72* (K); fl., *Mon. Nr. 73*, on same sheet: fl., *Mon. Nr. 74* and: *Mrs. Gen. Walker*, fl., *Mon. Nr. 75*, f. *acuminata* (NY); *Walker 1461*, fl. and fr., *Mon. Nr. 76* (GL); *Walker*, fl., *Mon. Nr. 77* (P); fl., *Mon. Nr. 78*, and on same sheet: old fl. and fr., *Mon. Nr. 79* (CAL); *Walker*, fl., *Mon. Nr. 80*, f. *acuminata* (GL); *Walker 1461*, fl. and fr., *Mon. Nr. 81* (E); Galagama, *Thwaites (C. P. 192)*, Febr. 1846 and *Mrs. Walker*, fl., *Mon. Nr. 82* and fl., *Mon. Nr. 83* (K); *Col. Walker*, fl., *Mon. Nr. 84* (K); *Walker*, fl., *Mon. Nr. 85* (P); *Walker*, fl., *Mon. Nr. 86* (CAL); *Thwaites*, 1854, fl., *Mon. Nr. 87*, and on same sheet: *Mon. Nr. 88* (P); fl., *Mon. Nr. 89* (P); *Dr. Kelaart*, fl. and fr., *Mon. Nr. 90* (K); *Willis*, fl., *Mon. Nr. 91* and on same sheet: fl., *Mon. Nr. 92* (A); fl., *Mon. Nr. 93*, and on same sheet: *Mon. Nr. 93a*, f. *rotunda* (GL); Herb. Bog. 23708, *Mon. Nr. 94*, and on same sheet: *Mon. Nr. 95* (BO); *Walker*, Herb. Lugd. Bat. 908.225—186, fl., *Mon. Nr. 96*, f. *rotunda*, *type-specimen*, (L); *Walker*, fl., *Mon. Nr. 97*, f. *rotunda* (GL); *Mackinzie*, 1839, fl., *Mon. Nr. 98*, f. *rotunda*, (K); Herb. Bog. 23709, buds, *Mon. Nr. 99*, f. *rotunda* (BO); Herb. Bog. 23711, buds, fl. and old fl., *Mon. Nr. 100*, f. *rotunda* (BO); *Gardner 527*, buds and fl., *Mon. Nr. 101* (K); fl., *Mon. Nr. 102*, and on same sheet: *Walker*, fl. and fr., *Mon. Nr. 103*, f. *rotunda* (K); Herb. Lugd. Bat. 908.225—182, fl., *Mon. Nr. 104* (L); *Walker*, fr., *Mon. Nr. 105*, f. *rotunda*, and on same sheet: Adams Peak, *Thwaites*, fl., March 1846, *Mon. Nr. 106* (K); Herb. Lugd. Bat. 908.225—192, *Mon. Nr. 107* and fl., *Mon. Nr. 108* (L); *Thwaites*, 1866, fl., *Mon. Nr. 109*, f. *acuminatissima* (G); Pardoonlah, *Thwaites*, fl., Sept. 1864, *Mon. Nr. 110*, f. *acuminatissima*, *type-specimen*, (K); *Thwaites*, 1868, fl., *Mon. Nr. 111*, f. *acuminatissima* (P); Hinidoon, *Thwaites*, buds, fl. and fr., *Mon. Nr. 112*, f. *major*, *lecto-type* of *I. wightiana* DC., var. *major* Clarke, (K); Galagama, *Thwaites*, fl. Febr. 1846, *Mon. Nr. 113*, f. *angustata*, *lecto-type* of *I. wightiana* DC., var. *angustata* Thw., and on same sheet: fl., *Mon. Nr. 113a*, f. *angustata* (K); *Thwaites*, fl., *Mon. Nr. 114*, f. *angustata* (G); *Thwaites*, fl., *Mon. Nr. 115*, f. *angustata*, and on same sheet: fl., *Mon. Nr. 116*, f. *angustata* (G); *Thwaites*, 1854, fl., *Mon. Nr. 117* (P); *Walker*, fl., *Mon. Nr. 180* (K); fl., *Mon. Nr. 187* (CAL); fl., *Mon. Nr. 189* (CAL); old fl. and fr., *Mon. Nr. 226* (G); *Mon. Nr. 229* (P).

BORNEO: Res. W. Borneo, Distr. Mempawah, kamp. Mandor, alt. 5 m, *Beck 7*, N.I. For. Serv., bb. 15337, 4 June 1931, nom. nat. Njato burung, young tree ± 16 m high, *Mon. Nr. 118*, f. *borneensis*, *type-specimen*, (BO); idem, *Mon. Nr. 118a* (L), *co-type*.

Habitat: in evergreen forests, 2000—6000 ft, forma *borneensis* is a low-country form, in old forests, in swamps, peat-ground, few specimens together.

Var. β **gracilis** (H. J. Lam) Jeuken, var. nov. — *I. gracilis* H. J. Lam, Bull. Jard. Bot. Buit., Sér. III, Vol. VIII, 4, 1927, 418 and 419, fig. 7 — *Palaquium beccarianum* Pierre, sectio *Coronisia* Pierre, (= *Coronisia beccariana*, *Isonandra* vel *Coronisia vaga*, *Palaquium vagum*), nom. nuda in schedula.

Folia utrinque glabra, obovato-lanceolata, basi attenuato-cuneata, apice brevissime obtuse acuminata, supra saepe atro-livida, subtus fusca, circiter 6—10 cm longa, 2—4.7 cm lata, petiolo sulcato 0.6—1.5 cm longo; nervi secundarii 12—13; *inflorescentiae* 2—3-florae; alabastrorum pedicelli 0.3 cm longi, post anthesin 0.7 cm, in fructu 1 cm longi; calycis *sepala* 4—5, 0.2 cm longa; corolla 4(—5?)-loba; *stamina* 8—9, non exserta, antherae glabrae, acuminatae; *ovarium* 4-loculatum; *fructus* globosi, 1 cm longi; *semina* 1—2 in fructu. — Borneo. — *Fig. 1j.*

BORNEO: *Beccari 2490*, fl., *Mon. Nr. 119, type-specimen* of *Palaquium beccarianum* Pierre, (P); Res. S. and E. Division, Samenggaris, *Amdjah 985*, fl. and fr., Dec. 1912, *Mon. Nr. 120, type-specimen* of *I. gracilis* H. J. Lam (BO); idem, *typ. dupl., Mon. Nr. 121* (L), *Mon. Nr. 122* (U), Herb. Bog. 23703—23706, *Mon. Nr. 123—126* (BO); Res. Z.O. Borneo, Distr. Berauw, near Karai, *v. d. Zwaan 1217*, N.I. For. Serv. bb. 19165, alt. 75 m, fr., 17 June 1934, nom. nat. *petanang*, tree 24 m alt., *Mon. Nr. 127* (BO); Res. W. Borneo, Distr. Pamangkat, near Paloh, alt. 5 m, *Bianchi 8*, N.I. For. Serv., bb. 11336, fl. and fr., 11 Febr. 1927, tree ± 24 m, fruit green, nat. nom. *murun*, leaves lanceolate, 6—10 × 2—3 cm, *Mon. Nr. 178* (BO) and *Mon. Nr. 179* (L).

Habitat: alt. 5—75 m and also in hilly regions, common and scattered, in old dry forests.

Discussion.

1. As constant and specific features of *I. lanceolata* Wight are considered the acuminate leaf-tip in combination with the transversally parallel tertiary nerves.

2. The present species differs from *I. perrottetiana* DC. by the acuminate leaf-tip (in *I. perr.* rounded), and from *I. zeylanica* Jeuken by the transversally parallel tertiary nervation (in *I. zeyl.* transversally reticulate).

3. The identity of *I. lanceolata* Wight and *I. wightiana* DC. has already been stated by Trimen (Fl. Ceylon III, 1895, 78):

> "I cannot see how to separate *I. Wightiana*, A. DC., from this (*I. lanc.*, M. J.). The plant is extremely variable in foliage, but not otherwise."

and by Dubard (Bull. Mus. Hist. Nat. XV, 1909, 27):

> "L'*I. Wightiana* A. D. C., de Ceylan, me paraît être une forme à peine différente de l'espèce précédente (*I. lanc.*, M. J.); la description du prodrome n'offre guère de ressource pour les distinguer. Il n'y a pas lieu de tenir compte de faibles différences dans la forme des feuilles, le mode de nervation restant parfaitement identique; la villosité du calice est bien la même de part et d'autre, malgré l'erreur de de Candolle, au sujet de l'*I. lanceolata* (A. DC. in Prodr. VIII: "lobisque calycinis ovatis subacutis glabris." M. J.); l'opinion de Clarke sur l'étroite affinité des formes précédentes doit donc prévaloir (see the present paper, p. 552, M. J.), et je pense qu'il faut sans hésiter supprimer l'*I. Wightiana* de la nomenclature; ce serait même une variété tellement peu accentuée qu'on peut douter de son existence réelle."

Both type-specimens show the same characters. The distinction as to the glabrous or pilose anthers is of little value, a has been pointed out in the introduction. I therefore support the conclusion of Trimen and Dubard about the identity of the two species.

4. *Sideroxylon tomentosum* Roxb. (Pl. Cor. I, 28; cf. A. DC., l. c., 1844, 188; Clarke, l. c., 1882, 539) is not a synonym of *I. lanceolata* Wight, resp. *I. wightiana* DC., as is proved by the following points:

a. Roxburgh, l. c., 1795, 28: "*Nectary:* five petals alternate with the filaments, waved, length of the stamens. *Stamens* five."

b. Don's Gard. Dict. IV, 1838, 28, to which refers A. DC., l. c., refers again to Roxburgh, l. c.

The presence of staminodes is no *Isonandra* character. It is *Planchonella tomentosa* (Roxb.) Pierre, Not. Bot., 1890, 36.

5. *Sideroxylon wightianum* Wall. (Cat. No. 4154) is not a synonym of *I. lanceolata* Wight resp. *I. wightiana* DC. (cf. A. DC., l. c., 1844, 188; Clarke, l. c., 1882, 539; Index Kew.), on account of the following points:

a. Don's Gard. Dict. IV, 1838, 28: "S. Wightianum Wall. No. 4154 appears to be only a more glabrous variety of S. tomentosum."

b. The name of Wallich seems to be a nomen nudum, so we have to rely on the remark made by Don.

I therefore conclude that also this species is *Planchonella tomentosa* (Roxb.) Pierre.

6. *Sideroxylon wightianum* Hook. and Arnott (Bot. Beech. Voy., 1841, 196, tab. 41) is not a synonym of *I. wightiana* DC. (cf. Index Kew.), on account of the following points:

a. The tabula in Hooker and Arnott, l. c., depicts a 5-merous flower, 5 staminodes and 5 stamens.

b. A. DC., l. c., 1844, 178: "... staminibus sterilibus lanceolatis integris lobos corollae aequantibus ..."

The staminodes make it impossible to insert the species in *Isonandra*.

Note. A. De Candolle (l. c., 1844, 178) makes the following remark:

> "S. Wightianum Wall. (num. 4154 nec 4147 ut scrips. Hook. et Arn.) est genus Isonandra, habitu foliisque simillimum, sed floribus quaternariis, staminibus omnibus fertilibus. An confusio quaedam in speciminibus Wallichianis?"

The question is solved in our remark 5.

7. Regarding var. *gracilis*, it is true that the nervation of the leaves is *lanceolata*-like, but the secondary nerves are more numerous. The main character however, lies in the variable number of the flower parts, which induced Pierre to create his section *Coronisia*.

It is beyond doubt that *Palaquium beccarianum* Pierre is conspecific with *I. gracilis* H. J. Lam. Independently both authors studied the same species. Pierre solved the problem in terms of *Palaquium*, Lam in terms of *Isonandra*. I examined the type-specimens of both. Only Lam has published his species in accordance with the Int. Rules of Bot. Nomenclature.

8. The correct orthography is *I. lanceolata*, not *lanciolata*, as is found sometimes in literature.

2. Isonandra perrottetiana DC., Prodr. VIII, 1844, 188; Wight, Ic. Pl. IV, 1850, tab. 1219; Walpers, Ann. Bot. Syst. I, 1850, 497; Wight, Spic. Neilgh. II, 1851, tab. 142; Thwaites, Enum. Pl. Zeyl., 1864, 177; Clarke in Hooker, Fl. Brit. Ind. III, 1882, 539; Trimen, Fl. Ceyl. III, 1895, 77; Dubard, Bull. Mus. Hist. Nat. XV, 1909, 29; Rev. Gén. Bot. 21, 1909, 393; Gamble, Fl. Madr. IV, 1921, 761; Lam, Bull. Jard. Bot. Buit., Sér. III, Vol. VII, 1—2, 1925, 110 et 258 and Vol. VIII, 4, 1927, 421 — *I. candolleana* Wight, Ic. Pl. IV, 1850, tab. 1220; Walpers, l. c., 1850, 496; Thwaites, l. c., 1864, 177; Dalzell and Gibson, Bomb. Fl., 1861, 139; Clarke, l. c., 1882, 539; Trimen, l. c., 1895, 77; Cooke, Fl. Bomb. II, 1908, 91; Dubard, Bull., 1909, 29; Rev. Gén., 1909, 393; Gamble, l. c., 1921, 761;

Lam, l. c., 1925, 110 et 258 — *I. alphonseana* Dubard, Bull., 1909, 29; Rev. Gén., 1909, 393; Lam, l. c., 1925, 258 and 1927, 421.

Synonyma excludenda: *I. wightiana* DC., cf. Thwaites, l. c., 1864, 177 — *I. lanceolata* Wight, cf. Thwaites, l. c., 1864, 177.

Descriptio speciei emendata. — *Ramuli* teretes, glabri, juvenilibus ferrugineo-pubescentibus; *folia* utrinque glabra, juvenilibus ferrugineo-pubescentibus, elliptico-oblonga, apice obtusa, basi acuta, circiter 3—10 cm longa, 1.5—4.5 cm lata, petiolo sulcato 0.5—1.0 cm longo; costa media subtus prominens; nervi secundarii 9—12, tenui, subtus prominentes, angulo circiter 55° de costa adscendentes, in nervum intramarginalem confluentes; nervi tertiarii permulti, tenuissimi, inter sese transversaliter paralleli, in initio costa media, mox autem nervis secundariis fere perpendiculares, aliquando tendentia ad reticulationem; *inflorescentiae* circiter 8-florae in foliorum axillis insertae vel flores dense conferti in fasciculis quasi amplexicaulibus, sessiles vel breviter, circiter 0.1 cm, pedicellati; *calyx* 0.2—0.3 cm longus; sepala 4—5, intus glabra, deltoideo-rotundata; *corolla* 4—5-partita, usque ad 0.3 cm longa, exserta, lobis rotundatis vel apice truncatis, glabris vel in apice tantum pilosis; *stamina* 8—10, circiter 0.15 cm longa; antherae saltem ad apicem, plerumque etiam ad basin et inter thecas pilosae; *ovarium* 4—5-loculatum (in uno flore 6-loc.), 0.1 cm altum; ovula ovoidea; *fructus* circiter 1.5—2 cm longus, oblongo-ovoideus. — Deccan. — *Fig. 4a.*

Descriptio lecto-typi, Perrottet, 1840 (G), *Mon. Nr. 165* — *Arbor* 3—6 m alta et ultra, ramosa; *ramis* subpatulis; *folia* fusca, circiter 6—10 cm longa, 3—4.5 cm lata, petiolo sulcato 0.5—1.0 cm longo; nervi secundarii 10—12; nervi tertiarii transversaliter paralleli; *sepala* 4, fere 0.3 cm longa, intus glabra; *corolla* 4-partita, lobis ovato-rotundatis, vix pilosis, albis (sic in annotatione A. DC. in schedula; Perrottet annotat: "flores flavidi"), in floribus junioribus 0.1 cm supra calycem exsertis; *stamina* 8; antherae filamento aequilongae, basi obtusae, apice angustiores, ad apicem et ad basin pilosae; *ovarium* 4-loculare, loculis episepalibus; *fructus* et *semen* ignoti.

Note. A. DC. in Prodr., l. c., 1844, 188: "Folia... minime in acumen producta, minus membranacea (quam in *I. wightiana* DC., M. J.), nervis tertiariis minus distinctis."

Descriptio lecto-typi *I. candolleanae* Wight, in herb. Kew., Avelanche, 1846, *Herb. Wight 1734*; *Mon. Nr. 134.* — *Folia* fusca, supra atro-brunnea, nitida, 3—6 cm longa, 1.2—2 cm lata, petiolo sulcato circiter 0.5 cm longo; nervi secundarii 9—10; nervi tertiarii transversaliter paralleli; *pedicelli* florum circiter 0.15 cm longi; *calyx* 0.2 cm longus, sepala 4, interdum 5 parvo sepalo extus adjuncto, intus glabra; *corolla* 4-partita, in floribus junioribus 0.1 cm supra calycem exserta, lobis ovato-rotundatis, glabris, apice truncatis et paulo pilosis; *stamina* 8; antherae basi obtusae, apice angustiores, ad apicem, ad basin et inter thecas valde pilosae; *ovarium* 4—5-loculatum; *fructus* et *semen* ignoti.

Note. In Ic. Pl. 1220, fig. 2, a corolla with 5 lobes is also pictured.

Descriptio lecto-typi *I. alphonseanae* Dubard, *Herb. Wight, 1736* (K), *Mon. Nr. 167.* (For the justification of this choice, see the discussion, p. 565) — *Folia* fusca, circiter 6—9 cm longa, 2.3—3.7 cm lata, petiolo sulcato 0.7—1.0 cm longo; nervi secundarii 10—11; nervi tertiarii

transversaliter paralleli; *inflorescentiae* in axillis foliorum aliquando caducorum eoque modo etiam juxta ramulos positae; pedicelli florum 0.1 cm longi; *calyx* 0.2 cm longus; sepala 4, intus glabra; *corolla* 4-partita, lobis ovato-rotundatis, glabris, non exsertis; *stamina* 8, antherae basi obtusae, apice angustiores, ad apicem et ad basin pilosae; *ovarium* 4-loculare; *fructus* et *semen* ignoti.

Note. In Ic. Pl. 1219, fig. 6, a 5-celled ovary is pictured.

DECCAN: Coorg, *Perree 27*, 1919, *Mon. Nr. 128* (CAL); Kodanad 6000 ft, *Gamble 16731*, fr., Sept. 1885, *Mon. Nr. 129* (K); Neilgherries circa Dodabetta, *Perrottet, 1840*, fl., "arbor 10—20 pedalis et ultra, ramosa, ramis subpatulis; flores flavidi", *Mon. Nr. 165, type-specimen*, (G); Sisparah 6000 ft, *Gamble 14415*, old fl., May 1884, *Mon. Nr. 130* (K) and *Mon. Nr. 131* (CAL); S.E. Wynaad 3000 ft, *Lawson*, fl., Nov. 1884, *Mon. Nr. 132* (K); (Herb. Wight 1734), Chispauray, fl., April 1846, *Mon. Nr. 133*, and on same sheet: Avelanche, fl., April 1846, *Mon. Nr. 134, lecto-type* of *I. candolleana* Wight, (K); Neilgherries, fl., *Mon. Nr. 135* (K); fl., *Mon. Nr. 136*, and on same sheet: *Gardner*, fl., *Mon. Nr. 137* (K); Nilgiris, *Beddome*, fl., *Mon. Nr. 138* (CAL); Neilgherries, *Gardner*, 1847, fl., *Mon. Nr. 139*, (and on same sheet: fl., *Mon. Nr. 140, I. lanceolata* Wight), (K); Neilgherries, *Gardner*, 1847, fl., *Mon. Nr. 141* (K); Avelanche, fl., *Mon. Nr. 142* (CAL); Coimbatore, *Fischer 913*, fl., 20 Mar. 1906, *Mon. Nr. 143* (CAL) and *Mon. Nr. 144* (CAL) and *Mon. Nr. 145* (K); Anamalai, Lyerpadi 4000 ft, *Fischer 3716*, fl., 6 April 1914, leaves more like *I. lanceolata*, but flowers like *I. perr.*, especially by the dark pilose anthers, *Mon. Nr. 146* (CAL); Anamalai Hills, Konal-ar, 6400 ft, *Fischer 3727*, buds an old fl., 22 April 1914, *Mon. Nr. 147* (CAL); Pulney Hills, Madura Dt., Kodaikanal 7000 ft, *Anglade S.J. 603*, fl., Nov., *Mon. Nr. 148* (G); Kodaikanal 1000—8000 ft, *Anglade*, fl., *Mon. Nr. 149* (A); Pulneys, Kodaikanal Shola, *Bourne 396*, fl. and fr., 12 June 1897, "fruit ellipsoid orange", *Mon. Nr. 150* (K) and *Mon. Nr. 151*, "fruit about 1 in long", (CAL); Periya Shola, *Bourne 1122*, fl., 21 April 1898, *Mon. Nr. 152* (K) and *Mon. Nr. 153* (K); nr. Chiminujie, 4000 ft, *Bourdillon 567*, fl., 5 April '95, " A small tree, common at the higher elevations, evergreen forests", *Mon. Nr. 154* (K) and *Mon. Nr. 155* (CAL); Travancore, *Bourdillon* sine num., fl., *Mon. Nr. 156* (CAL); Mutthu, Kuli Vazal, 4500 ft, *Bourdillon 789*, fl., 24 Mar. '96, "A medium sized tree found only at the higher elevations", *Mon. Nr. 157* (CAL) and *Mon. Nr. 159* (one flower with 6-celled ovary) (K). On the same sheet as Mon. Nr. 159: Neilgherries, *Adam*, fl., *Mon. Nr. 158* (K); Near Chiminujie, 4000 ft, *Bourdillon 950*, fl., 6 Apr. '98, "A small tree with milky juice, Evergreen forests", *Mon. Nr. 160* (CAL); Kulkuntal, 5000 ft, *Meebold 701. 13094*, fr., Dec. 1910, "fruit orange", *Mon. Nr. 161* (CAL); Santhanpara 4—5000 ft, *Meebold 597, 13289*, buds, Dec. 1910, *Mon. Nr. 162* (CAL) and *Mon. Nr. 255* (S); Vellyengry Hill, (Herb. Wight 1783), fl., April 1850, *Mon. Nr. 163* (K); High Wavy Mountain, 4000—5000 ft, *Blatter and Hallberg 48*, old fl., May 1917, "fl. white", *Mon. Nr. 164* (CAL); Pen. Ind. Or., unknown loc., (Herb. Wight 1736), fl., *Mon. Nr. 166*, on same sheet: fl., *Mon. Nr. 167, lecto-type* of *I. alphonseana Dubard*, and fl., *Mon. Nr. 168* (K); Herb. Lugd. Bat. 908.225—170, fl., *Mon. Nr. 169* (L); fl., *Mon. Nr. 170* (CAL); Herb. Lugd. Bat. 908.225—144, fl., *Mon. Nr. 171* (L); fl., *Mon. Nr. 172* (P); fl., *Mon. Nr. 173* (G); fl., *Mon. Nr. 174*, and on same sheet: fl., *Mon. Nr. 175* (P); fl., *Mon. Nr. 176* (CAL); fl., *Mon. Nr. 177* (CAL); fl., *Mon Nr. 256* (S).

Habitat: alt. 2000—7000 ft, in evergreen forests, common.

Discussion.

1. Regarding *I. alphonseana* Dubard, this species has been created as a result of the comparison between the icones of Wight and the description of A. De Candolle. In his description of *I. perrottetiana* DC. the author states: "Antherae apice pilosae" (l. c. 188). In the picture given by Wight (Ic. Pl. IV, 1219), however, the anther-tips of *I. perrottetiana* DC. are glabrous, not pilose.

Considering that this is another species which Wight erroneously assumed to be *I. perrottetiana* of De Candolle, Dubard (following Clarke) identified the picture of Wight as *I. perrottetiana* Wight. However, finding that this was an incorrect combination, he created a new name: *I. alphonseana* Dubard (= Ic. Pl. 1219). The next picture, Ic. Pl. 1220, named by Wight: *I. candolleana* — the anther-tips are pilose — should, according to Dubard, be called *I. perrottetiana* DC.

Dubard refers to a remark of Clarke concerning the relation between *I. candolleana* Wight and *I. perrottetiana* Wight (not of DC):

> "(*I. candolleana* Wight). Only distinguishable from the next (*I. perr.* Wight, M. J.) by the hairy anther-tips and more membraneous leaves. A. DC. says his *I. Perottetiana* had the anthers pilose at the tips, but Wight split this species into two, whereof his *I. Candolliana* has the anther-tips pilose, his *I. Perottetiana* has them glabrous." (Clarke, l. c., 1882, 539).

Nowhere Dubard indicates, that he has actually seen a specimen of his *I. alphonseana*. It therefore seems likely, that his new species was created merely on account of the literature. Now, what is the truth?

In the material received from the Kew herbarium the specimens are found which were very probably used by Wight for his Icones: the number Herb. Wight 1734, *Mon. Nr. 134*, bears the name *"Isonandra Candolleana* Wt", written, as can be assumed, by Wight himself, since the handwriting is very much resembling that of Wight in the handwritings collection kept in the Rijksherbarium. This number 1734 from Kew must therefore have served as an example to Ic. 1220, *I. candolleana* Wight, and it has, accordingly, been chosen as the lecto-type of that synonym. The anther-tips are pilose, as could be confirmed by me.

The number Herb. Wight 1736 from Kew (*Mon. Nr. 167*) bears, written by the same hand, the name *"Isonandra Perotetiana* A. D.C." and must have served as an example to Ic. 1219 of the same name. Now it appeared that also this specimen has the anthers pilose not only at the tips, but also at the base. Wight's sketch as to this point is insufficient. This is not surprising, since Dubard himself drew the attention to another slight inaccuracy: In Ic. 539 (*I. lanceolata* Wight) the anthers are pictured glabrous; Dubard remarks that they are more or less hairy (Bull., 1909, 28, note 3).

The reason why Dubard has created his new species *I. alphonseana*, on account of the glabrous anther-tips only, does not hold. Actually the anthers are pilose. Therefore, *I. alphonseana* has to be considered a superfluous synonym of *I. perrottetiana* DC.

2. Regarding the identity of *I. candolleana* Wight and *I. perrottetiana* DC., Wight remarks at Ic. 1220 (*I. candolleana*):

> "This seems almost too nearly allied to the former (Ic. 1219, *I. perr.*, M. J.), but still the two plants when lying side by side seem perfectly distinct, even more so than in the figures; they besides occupy different stations, and I have never met with them together."

However, laying side by side the type specimen collected by Perrottet, and the Kew specimina Herb. Wight 1734 and 1736, there seems to be no reason to regard them to represent different species. The differences readily fall within the specific variability. In a way the specimen of Perrottet is intermediate between 1734 and 1736, both in habit and, to a certain extent, in the tertiary nervation. Moreover, the material collected later on and therefore not known at Wight's time, shows slight transitions between the different specimens of this species, which justifies, in spite of the words of Wight quoted, our conclusion about the identity.

Thus, the result is:

I. alphonseana Dubard is a superfluous name.

I. perrottetiana DC. = Ic. Pl. 1219 = Herb. Wight 1736 (K).

I. candolleana Wight = Ic. Pl. 1220 = Herb. Wight 1734 (K) = *I. perrottetiana* DC.

Note. Wight remarks, that *I. perrottetiana* DC. (Ic. 1219) occurs in the "Neilgherries, in jungles, about Sisparah and the Avalanche". The number 1734 (K) has both names as localities. For that reason, it might have served as an example to Ic. 1219. However, the dark pilosity, darker than in 1736, points to Ic. 1220, for which Wight mentions the locality: "Neilgherries, about Ootacamund and Pycarrah, in clumps of jungle". All this is of no influence on the conclusion mentioned.

3. Both in the literature and on the sheets various spellings may be found, such as: perotetiana, perrotetiana, perottetiana. The name of the collector being Perrottet, the correct orthography is, of course, *perrottetiana*. Similarly we should spell: *candolleana*, not (as was done by Wight): *candolliana*.

4. Wight remarks under *I. candolleana* Wight: "lobes of the calyx very unequal, exterior ones much larger and hairy". This feature occurs in all the type-specimens mentioned above. Also the inner sepal-whorl is hairy outside.

5. In some cases there was also found a tendency to an acuminate leaf-tip. This could be expected, since the present species is closely related to *I. lanceolata* Wight. However, the typical condition is a rounded leaf-tip.

3. **Isonandra zeylanica** Jeuken, species nova. — *I. wightiana* DC., in schedulis.

Descriptio speciei. — *Ramuli* teretes, glabri, innovationibus minute ferrugineo-pubescentibus; *folia* utrinque glabra, lanceolata, apice acuminata, basi acuta, supra fusca, subtus fulva vel virida, circiter 7.5—13 cm longa, 2.0—3.5 cm lata, petiolo levissime alato circiter 1 cm longo; costa media subtus prominens; nervi secundarii 5—8, subtus prominentes, angulo 55°—60° de costa adscendentes, prope marginem apicem versus deflectentes vel in partem adscendentem et partem descendentem bifurcati, parte adscendenti magis conspicua; nervi tertiarii transversaliter reticulati; *inflorescentiae* 6—10-florae in foliorum axillis insertae; pedicelli florum 0.1 cm longi; *calyx* 0.25—0.4 cm longus; sepala 4, oblonga, intus fere glabra, praesertim prope marginem paulo pubescentia; *corolla* 0.3 cm alta, 4-loba, lobis apice rotundatis, glabris; *stamina* 8, non exserta; antherae apice pilosae, acutae, 0.15 cm longae; *ovarium* circa 0.2 cm altum, 4-loculatum; stylus circiter 0.1 cm exsertus; *fructus* 1.4 cm longus, 0.5 cm latus, oblongus. — Ceylon. — *Fig. 2.*

Descriptio typi, Walker, *Mon. Nr. 181* (K). — *Calyx* 0.4 cm longus; *ovarium* alte conoideum, stylus brevis, 0.05—0.1 cm longus.

CEYLON: *Walker*, fl., *Mon. Nr. 181, type-specimen* (K) (on the same sheet: fl., *Mon. Nr. 180, I. lanceolata* Wight); fl., *Mon. Nr. 182* (GL); *Gardner 526*, fl., *Mon. Nr. 183* (K); Herb. Lugd. Bat. 908.225—154, fl., *Mon. Nr. 184* (L); *Thwaites*, fl., *Mon. Nr. 185* (G); fr., *Mon. Nr. 186* (on same sheet: fl., *Mon. Nr. 187, I. lanceolata* Wight) (CAL); fl., *Mon. Nr. 188* (on same sheet: fl., *Mon. Nr. 189, I. lanceolata* Wight), and also on same sheet: old fl., *Mon. Nr. 190* (CAL); *Thwaites,* 1853—55, fl., *Mon. Nr. 191* (G); *Thwaites,* fl., *Mon. Nr. 192* (G); Adams Peak, *Thwaites,* fl., March 1846, *Mon. Nr. 193* (K); fl., *Mon. Nr. 195* (on same sheet: old fl., *Mon. Nr. 194, I. alloneura* Jeuken) (G).

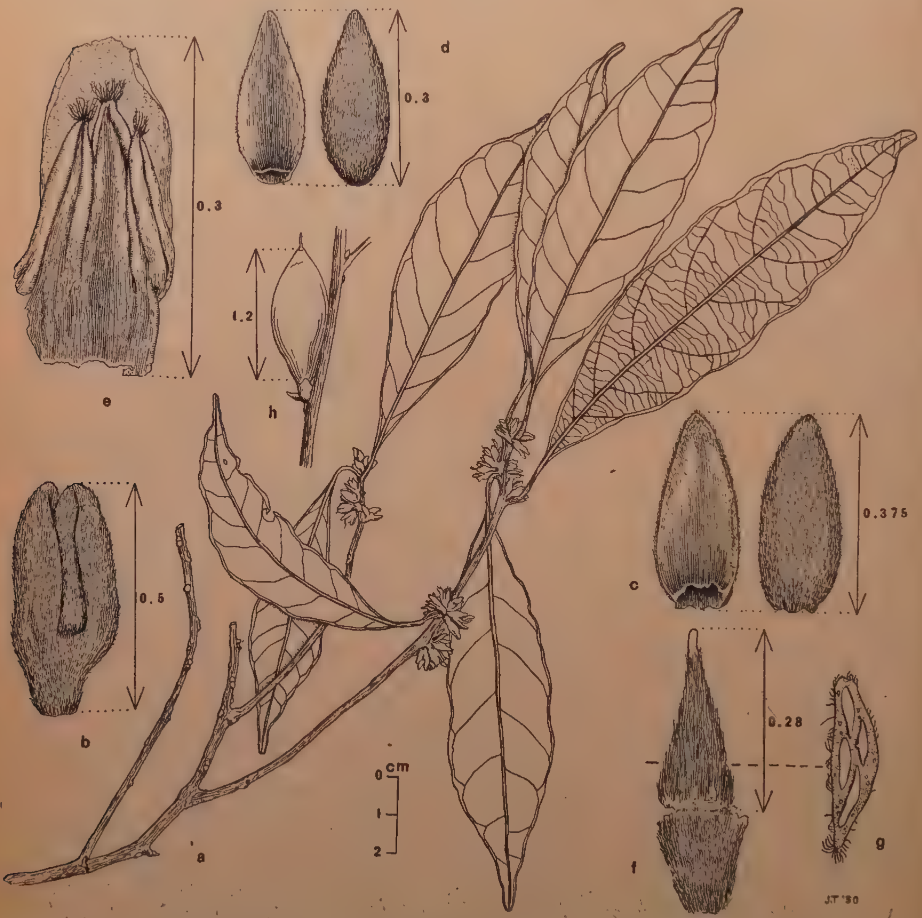


Fig. 2. *I. zeylanica* — a. branchlet with leaves and flowers; b. flower; c. outer sepal, inside and outside; d. inner sepal, idem; e. part of corolla with stamens; f. ovary; g. cross-section of the ovary; h. fruit. a—g from the type-specimen, Mon. Nr. 181; h. from Mon. Nr. 186.

Discussion.

The present species differs from *I. lanceolata* Wight by the transversally reticulate tertiary nervation (in *I. lanceolata* Wight transversally parallel). The specimens of the species were mostly determined *I. wightiana* DC., but comparison with the type-specimen of *I. wightiana* DC. shows that they represent a different, new, species.

4. **Isonandra villosa** Wight, Ic. Pl. II, 1840, tab. 360; A. De Candolle,

Prodr. VIII, 1844, 188; Clarke in Hooker. Fl. Brit. Ind. III, 1882, 538; Dubard, Bull. Mus. Hist. Nat. XV, 1909, 29; Rev. Gén. Bot. 21, 1909, 393; Gamble, Fl. Madr. IV, 1921, 761; Lam, Bull. Jard. Bot. Buit., Sér. III, Vol. VII, 1—2, 1925, 109 et 258 and Vol. VIII, 4, 1927, 421.

Descriptio speciei emendata. — *Ramuli* teretes, usque ad 0.7 cm in diam., virgulis cicatricibusque foliorum scabri, juniores ferrugineo-pubescentes; *stipulae* deltoideo-acutae, 0.1 cm longae, mox deciduae; *folia* utrinque glabra, cerata, supra nitida, subtus opaca, obovata vel late elliptica, fere orbicularia, apice et basi rotundata, 4—11 cm longa, 3—6 cm lata, petiolo sulcato circiter 0.3—0.6 cm longo; costa media subtus basi prominens, apice inconspicua; nervi secundarii 11—15 subtus vix prominentes, angulo circiter 60° de costa adscendentes, prope marginem apicem folii versus deflectentes; nervi tertiarii inconspicui, transversaliter subparalleli, ad reticulationem inclinantes, nervis secundariis fere perpendiculares vel ab iis angulo 100°—140° descendentes, subdense conferti; *inflorescentiae* circiter 5-florae in axillis foliorum plerumque caducorum et super virgulas usque ad 0.5 cm longas praesertim juxta partem superiorem ramulorum positae; florum pedicelli circiter 0.1 cm longi, post anthesin 0.2 cm; *calyx* 0.25—0.3 cm longus; sepala 4, intus glabra; *corolla* circiter 0.1 cm exserta, glabra, extus basi tubi et apice loborum paulo pilosa, 4-loba, lobis rotundatis, apice truncatis; *stamina* 8 circiter 0.1 cm longa; antherae apice et parcius basi pilosae, apice obtusae; *ovarium* 4-loculatum, 0.1 cm altum; *fructus* 0.7—1.0 cm longus, oblongo-ovalis; embryonis radicula circiter 0.15 cm longa. — Deccan: Veligonda Hills. Kambakkam Hill, Quilon. — *Fig. 4b.*

Note. Fide Wight and A. De Candolle: "flores aurantiaci". Fide Fischer 4760: "corolla white".

Descriptio lecto-typi, *Herb. Wight 1733* (K), *Mon. Nr. 202.* — Folia 4—8 cm longa. Cetera descriptioni emendatae congruit.

DECCAN: Nellore Dt., Veligonda Hills, *Ramaswami 1400*, fl., 28 July 1914, *Mon. Nr. 196* (CAL) and *Mon. Nr. 197* (K); Chingleput Dt., Kambakkam Hill, 1800 ft, *Fischer 4760*, fl., 30 Aug. 1922, "corolla white", *Mon. Nr. 198* (CAL) and (number of Fischer not indicated) *Mon. Nr. 199* (US) and (number of Fischer not indicated) *Mon. Nr. 200* (K); Chingleput Dt., Kambakkam Hill, 2100 ft, *Fischer 4786*, fr., 7 April 1923, *Mon. Nr. 201* (CAL); (Herb. Wight 1733), fl. and fr., *Mon. Nr. 202, lecto-type*, and on same sheet: fl., *Mon. Nr. 202a* and: fl. and fr., *Mon. Nr. 202b* (K); fl. and fr., *Mon. Nr. 203* (K); Herb. Lugd. Bat. 908.225—196, fl. and fr., *Mon. Nr. 204* (L); fl. and fr., *Mon. Nr. 205* (P); fl. and fr., *Mon. Nr. 206* (GL); fl., *Mon. Nr. 207* (GL); fl., *Mon. Nr. 208* (E); fl., *Mon. Nr. 209* (CAL); Quilon, *Wight*, fl., *Mon. Nr. 210* (K).

Discussion.

1. The present species is very constant. It differs from *I. stocksii* Clarke by the more or less waxy leaves (in *I. stocksii* not waxy), the more numerous secondary nerves and the more strictly parallel tertiary nervation.

2. Wight remarks in his description (Ic. Pl. II, 1840, ad tab. 360): "young branches, petioles and under surfaces of the leaves clothed with rusty brown villi". On the other hand Clarke (l. c., 1882, 539) writes: "leaves ... glabrous", and remarks: "The most glabrous species of the genus. In Wight's specimen (figured in Ic. t. 360) the young leaves and shoots are as described above, and no part of the plant is villous." Also

Gamble (l. c., 1921, 760) describes in his key the plant as glabrous, and says: "quite glabrous in spite of its name."

The lecto-type was chosen because of the label "1733. *Isonandra villosa* Wt." presumedly written in Wight's handwriting (cf. the discussion under *I. perrottetiana* DC.). This specimen has the leaves glabrous, but was apparently more or less scorched during the process of drying. It shows a rusty brown colour, which may have induced Wight to give the description mentioned above, and the so inappropriately chosen name.

3. In the description by A. De Candolle (l. c., 1844, 188) it reads: "corollae profunde 5-fidae..." This is probably a mistake for "4-fidae", at least no 5-merous corollae were found by me.

4. The attention may be directed to the disjunct area between the extremes: Quilon and the Veligonda Hills.

5. Isonandra stocksii Clarke in Hooker, Fl. Brit. Ind. III, 1882, 539; Cooke, Fl. Bomb. II, 1908, 91; Dubard, Bull. Mus. Hist. Nat. XV, 1909, 29; Rev. Gén. Bot. 21, 1909, 393; Gamble, Fl. Madr. IV, 1921, 761; Lam, Bull. Jard. Bot. Buit., Sér. III, Vol. VII, 1—2, 1925, 110 et 259 and Vol. VIII, 4, 1927, 421.

Descriptio speciei emendata. — *Ramuli* teretes, usque ad 0.6 cm in diam., virgulis inflorescentiarum caducarum cicatricibusque foliorum scabri, juveniles ferrugineo-pubescentes; *folia* utrinque glabra, nitida, obovata, apice obtusa, basi magis acuta, fusca, circiter 7—12 cm longa, 3—6 cm lata, petiolo sulcato 0.6—1 cm longo; costa media subtus prominens; nervi secundarii 8—10, subtus prominentes, angulo circiter 65°—70° de costa adscendentes, ante marginem in partem adscendentem et partem descendentem bifurcati, parte adscendenti magis conspicua; nervi tertiarii transversaliter reticulati; *inflorescentiae* 4—5 florae multae juxta ramulos super virgulas, floribus sessilibus vel perbreviter pedicellatis; *calyx* 0.2 cm longus, sepala 4, intus glabra; *corolla* 4-loba, lobis rotundatis, apice truncatis, glabris; *stamina* 8; antherae apice et basi pilosae; *ovarium* 4-loculatum, 0.1 cm altum cum stylo 0.2 cm longo post anthesin; *fructus* et *semen* ignoti. — Deccan. — *Fig. 4c.*

Descriptio lecto-typi, Malabar, Concan. Coll. Stocks, Law, etc. (K), *Mon. Nr. 211.* — Cum descriptione speciei modo data congruit.

DECCAN: Malabar, Concan etc. *Stocks, Law etc.*, buds and old fl., *Mon. Nr. 211, lecto-type* (K); Malabar, Concan etc., *Stocks, Law etc.*, old fl., *Mon. Nr. 212* (K); *Warree*, old fl., *Mon. Nr. 213* (CAL); *Gibson*, old fl., *Mon. Nr. 214* (CAL).

Discussion.

1. The species differs from *I. perrottetiana* DC. by the obovate leaves and especially by the secondary and tertiary nervation: the secondary nerves splitting into two parts near the margin, the tertiary ones being transversally reticulate. *I. perrottetiana* DC. has the secondary nervation curving towards the leaf-tip, the tertiary transversally parallel.

2. The species differs from *I. villosa* Wight by the not waxy leaves, and also by the secondary and tertiary nervation. Clarke remarks (l. c., 1882, 539):

> "This (*I. stocksii*, M. J.), by the leaves clustered at the summits of the branches, and by the inflorescence, approaches *I. villosa*, but the primary and secondary nervation (in our terminology the secondary and tertiary nervation, M. J.) of the leaves is different."

In *I. villosa* Wight the nervation is on the lower-side of the leaf not so distinctly prominent, especially towards the tip; the secondary nerves are more numerous and the tertiary ones are more distinctly transversally parallel though little conspicuous.

3. The species differs from *I. montana* Gamble by the larger leaves and also by the secondary and tertiary nervation. In *I. montana* the secondary nerves are fewer and the tertiary ones are strictly reticulate. The leaf-tip is also often shortly acuminate.

4. Cooke (l. c., 1908, 91) made the following remark:

> "*Isonandra Stocksii*, C. B. Clarke, in Hook.f. Fl. B. I. v. 3, p. 539, is stated in the Fl. B. I. to occur in the Konkan, but it has never, so far as I know, been found there by any botanists. Neither Talbot nor Woodrow have seen it. There are 2 specimens in Herb. Kew., the tickets on which are *printed* ones on which appear the words "Hab. Malabar, Concan &c. Coll. Stocks, Law &c."
>
> There is therefore no certainty as to the locality from which these specimens came, and they are not authenticated by the signatures of either Law or Stocks."

The two specimens from the Calcutta Herbarium do not mention any solution either, no locality being indicated on their labels.

5. Gamble (l. c., 1921, 761) indicates as locality: "Deccan, N. Coimbatore, in Shola forests (Fischer)". However, this specimen of Fischer is *I. perrottetiana* DC., (*Mon. Nr. 143, 144 and 145*), but tends to *I. stocksii* Clarke.

6. Isonandra montana Gamble, Fl. Madr. IV, 1921, 761 — *I. wightiana* DC. var. *montana* Thwaites, Enum. Pl. Zeyl., 1864, 177; Clarke in Hooker, Fl. Brit. Ind. III, 1882, 540; Dubard, Bull. Mus. Hist. Nat. XV, 1909, 28 — *I. lanceolata* Wight var. *montana* Thwaites in Trimen, Fl. Ceyl. III, 1895, 78.

Descriptio speciei emendata. — *Ramuli* teretes, glabri, scabri, in imis apicibus ferrugineo-pubescentes; *folia* glabra, opaca, et fulvo-ferruginea, obovato-spathulata, apice obtusa vel brevissime acuminata, basi acuta, 4—6 cm longa, 2—3 cm lata, petiolo 0.4—0.7 cm longo; costa media subtus prominens; nervi secundarii 5—7, subtus prominentes, angulo circiter 45° irregulariter de costa adscendentes, ante marginem saepe furcati; nervi tertiarii subtus conspicui, reticulati, sinuosi et confluentes; *inflorescentiae* circiter 10-florae juxta partem superiorem ramulorum in axillis foliorum plerumque caducorum positae, floribus sessilibus vel breviter, usque ad 0.1 cm, pedicellatis; *calyx* 0.3 cm longus, sepala 4, intus glabra, longe deltoidea, apice obtusa; *corolla* 4-loba non exserta, lobis rotundatis glabris; *stamina* 8 non exserta; antherae apice et basi parce pilosae, apice obtusae; *ovarium* 4-loculatum, parce pilosum, 0.1 cm altum; stylus longitudine ovario aequilongus; *fructus* et *semen* ignoti. — Ceylon. — *Fig. 4d.*

Descriptio lecto-typi, Ceylon, Thwaites (K), *Mon. Nr. 215.* — Congruit cum descriptione speciei supra data.

CEYLON: *Thwaites* (C. P. 3092), fl., *Mon. Nr. 215, lecto-type,* (K); *Thwaites,* fl., *Mon. Nr. 216* (G); *Thwaites,* fl., *Mon. Nr. 217* (G); *Thwaites,* 1853—55, fl., *Mon. Nr. 218* (G); *Thwaites* 1854, fl., *Mon. Nr. 219* (P); fl., *Mon. Nr. 220* (CAL); *Thwaites,* (C. P. 2411), fl., *Mon. Nr. 221,* (*I. montana* Gamble × *I. compta* Dubard?) (K).

Discussion.

1. The species differs from *I. compta* Dubard by the dull, glabrous leaves, the irregular secondary nervation, the reticulate tertiary nervation and by the inflorescence, but it is nearly similar in the obovate-spathulate leaves. *I. compta* has the leaves tomentose and shining beneath, a more regular secondary nervation, an inconspicuous and more or less longitudinally reticulate tertiary nervation, and the inflorescences not so conspicuously arranged along the branchlets.

2. The species seems also related to *I. perakensis* King and Gamble, but differs from it by the inflorescences arranged along the branches, the glabrous leaves (in *I. perakensis* the leaves are tomentose beneath), the obovate-spathulate leaves with shortly acuminate leaf-tip and by the sessile flowers. *I. perakensis* has the leaves elliptical and blunt at tip.

3. The ovary is sparsely pilose or almost glabrous, an uncommon feature in the genus.

4. Dubard (l. c., 1909, 28) is inclined to see a hybrid in the present species: "...je ne serais pas éloigné de considérer cette forme comme un hybride entre l'*I. lanceolata* et la variété *Compta* de Thwaites (= *I. compta* Dubard, M. J.) ..."

However, since the features are constant, it seems better to consider it with Gamble a distinct species.

5. According to Gamble (l. c., 1921, 761) the species should occur also in Deccan: "W. Ghâts, hills of Travancore, in evergreen forests, above 4,000 ft. (Bourdillon)."

This must be a mistake: the species occurs only in Ceylon. The specimens of Bourdillon quoted by Gamble are *I. perrottetiana* DC., Mon. Nr. 154, 155, 160. Gamble refers his new species to *I. Wightiana* DC., var. *montana* Thwaites. This is a Ceylon plant (C. P. 3092).

7. **Isonandra alloneura** Jeuken, species nova — *I. wightiana* DC., in schedulis.

Descriptio speciei. — *Ramuli* teretes, glabri, in imis apicibus ferrugineo-pubescentes; *folia* minus coriacea, utrinque glabra, ovali-oblonga vel spathulata, apice brevissime obtuse acuminata, basi acuta, supra atrolivida, subtus fusca, circiter 6—8 cm longa, 2.5—4 cm lata, petiolo sulcato 0.5—0.8 cm longo; costa media subtus prominens; nervi secundarii 6—7, subtus leviter prominentes, supra inconspicui, angulo circiter 55°—60° de costa adscendentes, prope marginem apicem folii versus deflectentes; nervi tertiarii longitudinaliter reticulati; *inflorescentiae* 6—7-florae in axillis foliorum insertae, flores sessiles vel subsessiles, pedicello florum circiter 0.07 cm, in fructu 0.13 cm longo; *calyx* 0.2 cm longus; sepala 4, intus glabra, obtuse deltoideo-oblonga; *corolla* 4-loba, 0.2 cm alta, lobis apice truncatis, in alabastro extus paulo pubescentibus, apice pilosis; *stamina* 8 non exserta; antherae apice pilosae vel glabrae; *ovarium* 4-loculatum, in alabastro 0.04 cm altum, in flore circiter 0.1 cm; stylus in alabastro 0.06 cm longus, in flore circiter 0.1 cm; *fructus* 0.7—1.8 cm longus, 0.4—0.6 cm latus, oblongus, basi angustus; testa fusca. — Ceylon. — *Fig. 3.*

Descriptio typi, Ceylon, *Mon. Nr. 222* (G). — Congruit cum descriptione speciei modo data.

CEYLON: *Thwaites*, buds and old fl., *Mon. Nr. 222, type-specimen*, (G); *Thwaites*, fl., *Mon. Nr. 223* (G); *Thwaites 1853*, fr., *Mon. Nr. 224* (K); *Thwaites*, Herb. Bog. 23710, *Mon. Nr. 225* (BO); (old fl. and fr., *Mon. Nr. 226, I. lanceolata* Wight), and on same sheet: old. fl., *Mon. Nr. 227, I. alloneura* Jeuken × *I. compta* Dubard?, and also on same sheet: buds and fr., *Mon. Nr. 228* (G); (*Mon. Nr. 229, I. lanceolata* Wight), and on same sheet: fl., *Mon. Nr. 230, I. alloneura* Jeuken × *I. compta* Dubard? (P); Herb. Bog. 23712, fl., *Mon. Nr. 231, I. alloneura* Jeuken × *I. montana* Gamble? (BO); old fl., *Mon. Nr. 194* (G).

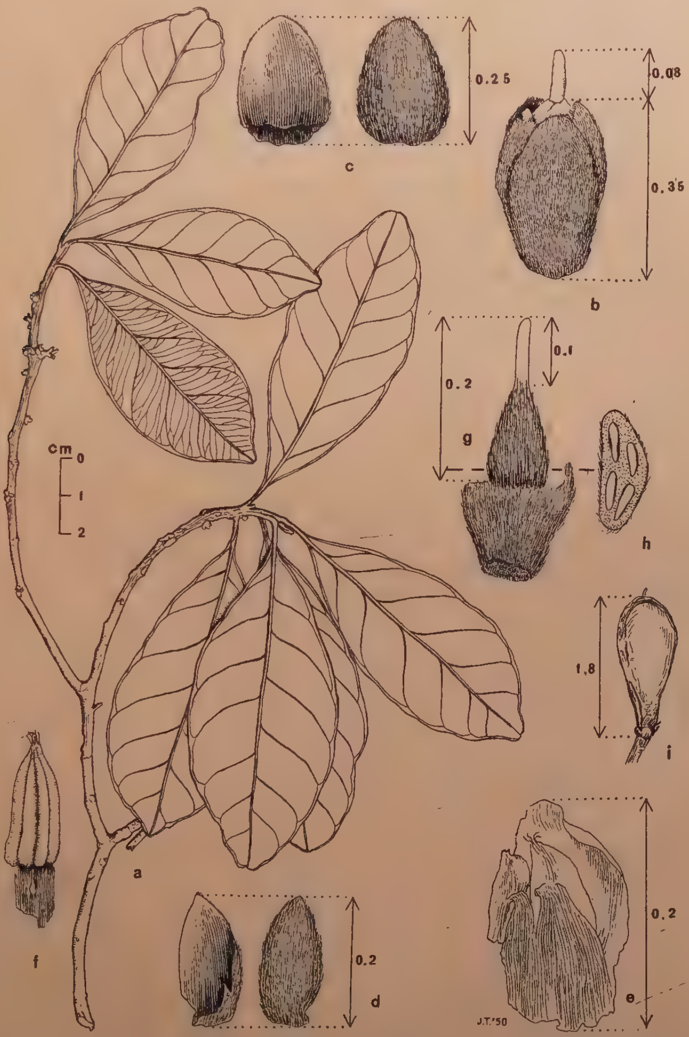


Fig. 3. *I. alloneura* — a. branchlet with leaves, buds and old flowers; b. flower; c. outer sepal, inside and outside; d. inner sepal, idem; e. part of corolla with stamens; f. stamen; g. ovary; h. id., cross-section; i. fruit. a. from type-specimen, Mon. Nr. 222; b—h. from Mon. Nr. 223; i. from Mon. Nr. 224.

Discussion.

1. The longitudinally reticulate tertiary nervation is only found in this species and in some way in *I. compta* Dubard. The latter species has the leaves tomentose beneath and can be easy distinguished from *I. alloneura* Jeuken.

2. In the figure of the present species, the flowers are taken from the specimen *Mon. Nr. 223*, the only one with flowers. However, this specimen has the leaves more coriaceous than the type-specimen, and the identification of *Mon. Nr. 223* with the present species could therefore, seem doubtful. There is some resemblance with *Mon. Nr. 227* and also with *Mon. Nr. 231*. In general, the species seems not very constant, and so, until more material will be collected, I have inserted the specimens with glabrous leaves and longitudinally reticulate tertiary nervation into this new species *I. alloneura*.

8. **Isonandra borneensis** H. J. Lam, Bull. Jard. Bot. Buit., Sér. III, Vol. VII, 1—2, 1925, 108 and 109, fig. 31 and Vol. VIII, 4, 1927, 418.

Descriptio speciei. — *Ramuli* teretes, glabri, innovationibus tantum puberuli; stipulae minimae, deltoideae, pubescentes, mox deciduae; *folia* ad ramulorum apices dense conferta, obovata, basi acuta vel cuneata, apice rotundata vel interdum latissime acuta, supra glabra, subtus cum petiolo dense adpresse ferrugineo-pubescentia, 2—5.8 cm longa, 1.2—3.2 cm lata, petiolo 0.4—0.8 cm longo; costa media subtus prominens; nervi secundarii subtus minus prominentes, conspicui, recti vel paulo curvati, utrinque circiter 11, angulo 50°—55° de costa adscendentes, prope marginem diminuentes; nervi tertiarii transversaliter paralleli, angulo 90°—100° de costa descendentes; *inflorescentiae* 2—3-florae in axillis foliorum positae; flores minutissimi, pedicellis 0.1—0.15 cm longis; *sepala* 4 vel interdum 5, 0.15 cm longa, exteriora 2 late ovata, interiora 2 vel 3 angustoria, pubescentia marginibus scariosis ciliatis exceptis, omnia intus glabra; *corolla* exserta, 0.2 cm longa, glabra, tubus 0.1 cm longus, cylindricus, petala 4 ovata, rotundata; *stamina* 8, filamenta 0.1 cm longa, antherae plus minus deltoideae, 0.05 cm longae, vix pilosae; *ovarium* cum stylo minuto conoideo vel punctiforme fere 0.2 cm longum, 4-loculatum; *fructus* (immaturus?) dense adpresse pubescens, angustissime ovoideus, 1.2 cm longus, 0.3 cm diam., apice obtusus; *semen* ignotum. — Borneo. — *Fig. 4e.*

Descriptio typi, Borneo, Boekit Mili, *Amdjah*, exp. *Nieuwenhuis, 162, Mon. Nr. 232,* (BO). — Congruit cum descriptione speciei supra data.

BORNEO: Boekit Mili, *Amdjah*, Exp. *Nieuwenhuis, 162*, fl. and fr. 14 Nov. 1898, *Mon. Nr. 232* (BO), *type-specimen*; idem, *Mon. Nr. 233* (BO), *co-type.*

Discussion.

This species is related to *I. perakensis* King and Gamble and to *I. compta* Dubard by the leaves tomentose beneath. It differs from *I. perakensis* by the smaller leaves and flowers and by the strictly transversally parallel tertiary nerves. *I. compta* Dubard has the leaves more shining, fewer secondary nerves, a more or less longitudinally reticulate tertiary nervation and larger flowers.

9. **Isonandra compta** Dubard, Bull. Mus. Hist. Nat. XV, 1909, 28;

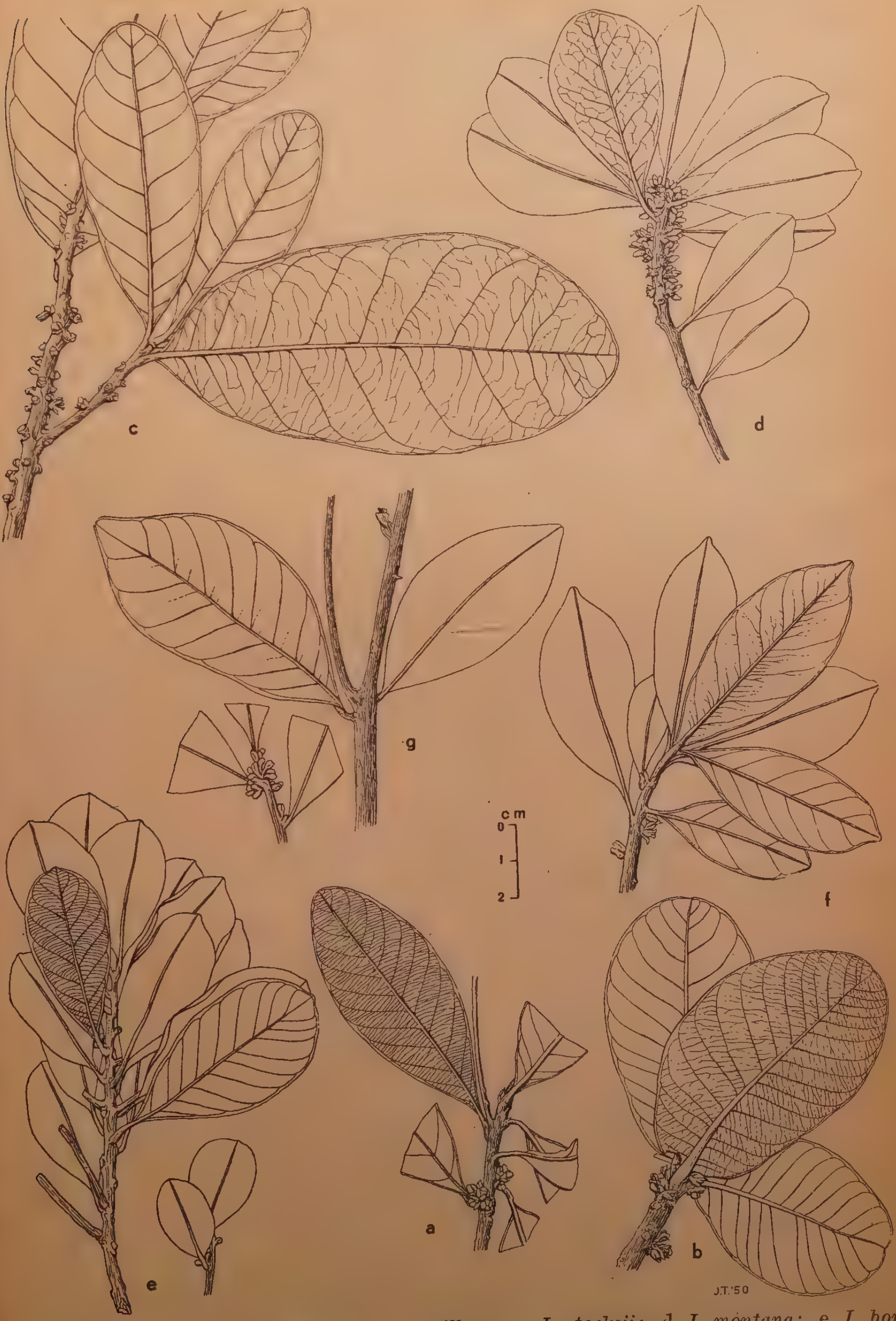


Fig. 4. — a. *I. perrottetiana*; b. *I. villosa*; c. *I. stocksii*; d. *I. montana*; e. *I. borneensis*; f. *compta*; g. *I. perakensis*. All figures taken from the type-specimens.

Rev. Gén. Bot 21, 1909, 393; Lam, Bull. Jard. Bot. Buit., Sér. III, Vol. VII, 1—2, 1925, 259 and Vol. VIII, 4, 1927, 421 — *I. wightiana* DC. var. *compta* Thwaites ex Clarke in Hooker, Fl. Brit. Ind. III, 1882, 540 — *I. lanceolata* Wight var. *compta* Thw. in Trimen, Fl. Ceyl. III, 1895, 78 — *Bassia (Isonandra) compta* Thwaites mss., in schedulis.

Descriptio speciei emendata. — *Ramuli* teretes, glabri, imis apicibus ferrugineo-pubescentibus; *folia* supra glabra, nitida, fulvo-ferruginea, subtus dense nitideque ferrugineo-pubescentia, ovali-oblonga vel spathulata, apice paulo, circiter 0.2 cm, acuminata, basi acuta, 4.5—8.5 cm longa, 2—3.5 cm lata, petiolo sulcato 0.5—0.9 cm longo; costa media subtus prominens; nervi secundarii 7—8, subtus prominentes, angulo circiter 55° de costa adscendentes, prope marginem cohaerentes flectione juxta marginem nervum superiorem versus, deinde margine discedentes; nervi tertiarii plus minusve longitudinaliter reticulati; *inflorescentiae* 7—8-florae in axillis foliorum positae, floribus sessilibus vel subsessilibus; *calyx* 0.3 cm longus, sepala 4, oblonga, obtusa, intus glabra, exteriora interioribus paulo altiora; *corolla* 4-loba, lobis obtusis, cum tubo 0.3 cm longis; *stamina* 8, 4 epipetalia paulo longiora 4 episepalibus, epipetalia corollae fere aequantia; antherae ad apicem et ad basin pilosae; *ovarium* 4—5-loculatum, 0.1 cm altum, stylus 0.25 cm longus; *fructus* et *semen* ignoti. — Ceylon. — *Fig. 4f.*

Descriptio lecto-typi, Ceylon, Centr. Prov., *Thwaites, C. P. 3912*, March 1866 (K), *Mon. Nr. 234.* — Congruit cum descriptione speciei modo data.

CEYLON: Centr. Prov., *Thwaites (C. P. 3912)*, fl., Mar. 1866, *Mon. Nr. 234*, *lecto-type* of *I. wightiana* DC. var. *compta* Thw. = *lecto-type* of *I. compta* Dubard (K); *Thwaites*, 1868, fl., *Mon. Nr. 235* (P); buds, *Mon. Nr. 236* (CAL); *Thwaites*, 1867, fl., *Mon. Nr. 238* (G); Adams Peak, *Thwaites*, fl., May 1866, leaves 9 × 5 cm, *Mon. Nr. 239* (K).

Discussion.

1. This species is related to *I. perakensis* King and Gamble and to *I. borneensis* H. J. Lam by the tomentose leaves, but it differs from the former by the spathulate, shining leaves with shortly acuminate tip, the more conspicuous and longitudinally reticulate tertiary nerves and the sessile flowers. *I. perakensis* has the leaves dull and elliptical, with rounded tip, the tertiary nerves are inconspicuous and transversally reticulate, and the flowers are pedicelled.

The present species differs from *I. borneensis* by its larger shining leaves, the fewer secondary nerves, the longitudinally reticulate tertiary nerves and by the larger flowers.

2. Beddome remarks that he has observed a form with the leaves fulvo-tomentose beneath on the Tinnevelly mountains (cf. For. Man. Bot., 1869, 141, and the present paper p. 551, 552). It is not clear which form he means. *I. compta* has the leaves fulvo-tomentose beneath, but I have only seen specimens from Ceylon, not from Deccan. Probably the form of Beddome is not an *Isonandra.*

3. The specimen used by Dubard for his description, Bull., 1909, 28, is *Mon. Nr. 235.* In his analysed flowers he found the ovary 5-celled. In *Mon. Nr. 234* I found a 4-celled ovary. In his description Dubard says: "8 étamines unisériées, les épipétales un peu plus courtes et moins déve-

loppées que les épisépales". The contrary is meant. The figure (by Dubard?) on the sheet *Mon. Nr. 235* shows the right situation.

10. **Isonandra perakensis** King and Gamble, Journ. As. Soc. Beng. 74, II, extr. nr. 17, 1906, 166; Ridley, Fl. Mal. Pen. II, 1923, 261; Lam, Bull. Jard. Bot. Buit., Sér. III, Vol. VII, 1—2, 1925, 108 and Vol. VIII, 4, 1927, 418.

Descriptio speciei. — *Arbor* parva, circiter 10 m alta; *ramuli* teretes, glabri, in imis apicibus ferrugineo-pubescentes; *folia* supra glabra, opaca, fulvo-ferruginea, subtus dense ferrugineo-pubescentia, elliptico-oblonga, apice obtusa, basi acuta, circiter 5—9 cm longa, 2.5—4 cm lata, petiolo 0.5—0.75 cm longo; costa media subtus prominens; nervi secundarii 8—10 subtus prominentes, angulo circiter 50°—60° de costa adscendentes, prope marginem apicem folii versus deflectentes; nervi tertiarii inconspicui, transversaliter reticulati; *inflorescentiae* 8—10-florae in axillis foliorum superiorum positae, pedicellis 0.2—0.25 cm longis, angularibus; *calyx* 0.25—0.3 cm longus, sepala 4—5, obtusa, intus glabra; *corolla* 4-loba, cum tubo 0.5 cm longa, lobis obtusis, tubo fere aequilongis; *stamina* 8 (in uno flore 9) corollae aequilonga; antherae sagittatae 0.08 cm longae, sparse pilosae pilis longis; *ovarium* 4-loculatum 0.1 cm altum; stylus circa 0.2 cm longus; *fructus* oblongus, acutus, 1—1.3 cm longus, fuscus; *semen* ellipsoideum, apice acutum, 0.8 cm longum. — Malay Peninsula. — *Fig. 4g.*

Descriptio typi, *King's collector 7138, Mon. Nr. 240,* est identica.

MALAY PENINSULA: Kuila Perak, Open Jungle, top of limestone mounts near G. M., 1000—1500 ft, *King's Collector 7138* ("a tree 30 to 40 ft high, stem 6 to 10 in. in D. Leaves dull, middle green, glossy brown underneath. Flower white, calex brown. Fruit light green."), buds, fl. and fr., January 1885, *Mon. Nr. 240* (CAL), *lecto-type; Co-types: Mon. Nr. 241, 242, 243* (CAL); *Mon. Nr. 244, 245* (K); *Mon. Nr. 246* (NY); *Mon. Nr. 247* (E); *Mon. Nr. 248* (with the name of King's Collector: *H. Kunstler*) (P).

Discussion.

1. The species is related to *I. compta* Dubard, but differs from it by the rounded leaf-tip and the elliptical form of the dull leaves. *I. compta* has shining, spathulate, acuminate leaves.

2. The species seems also related to *I. borneensis* H. J. Lam, but the latter has smaller leaves and flowers, the secondary nerves are more numerous, and the tertiary ones are transversally parallel.

3. There may be a relation to *I. montana* Gamble, but this species has the leaves not tomentose beneath, and the tertiary nerves are conspicuous. Moreover, in *I. montana* the secondary nerves are less numerous and the leaves are obovate and shortly acuminate. The inflorescences are inserted along the branchlets and the flowers are sessile.

Discussion about some excluded species.

1. *I. diplostemon* Clarke in Hooker, Fl. Brit. Ind. III, 1882, 540. — Deccan — This species is the same as *Diospyros obovata* Wight, Ic. Pl. 1226. However, it is not ebenaceous, but certainly belongs to the *Sapotaceae*. Only male flowers are known. The calyx has 2 whorls of 2 sepals, the corolla is deeply 6-cleft, the not extruding stamens are high in number, about 16, inserted on the corolla-tube; the rudiment of the ovary is a glabrous cone without cavity.

According to Lam, ms, it may represent a new genus of the *Sapotaceae*. (*Mon. Nr. 251, 252, 253* and *254*.)

2. *I. emarginata* H. J. Lam, Bull. Jard. Bot. Buit., Sér. III, VIII, 1927, 420, fig. 8. — Borneo — This species most probably is a synonym of *Palaquium multiflorum* (Pierre) Dubard. The last word about this synonymy cannot be spoken, since I have not seen the type-specimen of *I. emarginata*, only a specimen in the Rijksherbarium (Borneo, near Kuching, Haviland, *H. L. B. 908.167—687*, fl., Oct. 1892), which is certainly conspecific with the type-specimen of *Palaquium multiflorum* (*Beccari 1439*), but differs in a few points from the description given by Lam l. c.

The number of the flower-parts is mostly 6, as Pierre remarks. Pierre, giving a list of several flowers, concludes: "Dans cet éch., le nombre des sépales est presque toujours 6 en 2 séries de Palaquium. La corolle est de 5 à 6, le plus souvent de 6. Le nombre des étamines est le double de la corolle, et quelquefois d'avantage. L'ovaire est de 6 loges." cf. Pierre, ms, in *Beccari 1439* (P). The long-pedicelled flowers and the frequent occurrence of 6 sepals make the inclusion of *I. emarginata* H. J. Lam in *Isonandra* doubtful. Therefore, it seems better to consider this species a *Palaquium*, with a tendency towards *Isonandra*. (*Mon. Nr. 259, 260, 261* and *262*.)

3. *I. rufa* King and Gamble, Journ. As. Soc. Beng. LXXIV, 2, Extra Nr. 17, 1906, 166. — Malay Peninsula — Very imperfectly known. However, the glabrous ovary. the villous filaments, the 6 (?) corolla-lobes, the longer pedicels, and the type of nervation make it improbable that this is an *Isonandra*. The nervation recalls *Ganua*, as does the glabrous ovary, but probably the partitions of the ovary are perfect above the ovules, which is no *Ganua*-character. It had better be provisionally considered a new species of *Madhuca*. *(Mon. Nr. 249 and 250).*

Index

of species which have some time been described under Isonandra.

(Accepted species in roman, synonyms in italics.)

Abbreviations:

Lam, Bull. Jard. Bot. Buit., Sér. III, Vol. VII, 1—2, 1925 = Lam 1925
Lam, idem, Vol. VIII, 4, 1927 = Lam 1927
Index Kewensis = I. K.

I. acuminata Drury = Palaquium ellipticum (Engl.) Baill., cf. Lam 1927, 414.
I. acuminata Miquel = Palaquium gutta (Hook.) Baill., cf. Lam 1927, 387.
I. alloneura Jeuken, p. 572.
I. alphonseana Dubard = I. perrottetiana DC., p. 565.
I. argentata Teysmann & Binnendijk = Palaquium quercifolium (de Vr.) Burck, cf. Lam 1925, 53.
I. benjamina de Vriese = Payena leerii (T. & B.) Kurz, cf. Lam 1925, 137.
I. binnendijkii auct. ign. = Palaquium quercifolium (de Vr.) Burck (?). Fide Lam in annot. ad Icon. 86 A ex Herb. Par. Cf. Lam 1925, 53 and 1927, 399.
I. borneensis H. J. Lam, p. 574.
I. caloneura Kurz = Madhuca caloneura (Kurz) H. J. Lam, cf. Lam 1925, 265.
I. calophylla Kurz = Madhuca caloneura (Kurz) H. J. Lam, cf. Lam 1925, 265.

I. calophylla Teysmann & Binnendijk = Palaquium calophyllum (T. & B.) Pierre, cf. Lam 1925, 52.
I. canaliculata Thwaites = Palaquium canaliculatum (Thw.), Engler, cf. Lam 1925, 107.
I. candolleana Wight = I. perrottetiana DC., p. 566.
I. compta Dubard, p. 574.
I. dasyphylla Miquel = Payena dasyphylla (Miq.) Pierre, cf. Lam 1925, 143 and 1927, 431.
I. dasyphylla de Vriese = Palaquium dasyphyllum (de Vr.) Pierre, cf. Lam 1925, 73 and 1927, 431.
I. diepenhorstii Teysmann & de Vriese = Ganua motleyana (de Vr.) Pierre, cf. Lam 1925, 122.
I. diplostemon Clarke (= *Diospyros obovata* Wight); may be a new genus of the Sapotaceae, p. 577.
I. emarginata H. J. Lam = Palaquium multiflorum (Pierre) Dubard, p. 578.
I. gracilis H. J. Lam = I. lanceolata Wight var. gracilis (H. J. Lam) Jeuken, p. 561.
I. grandis Thwaites = Palaquium grande (Thw.) Engler, cf. Lam 1925, 107.
I. gutta Hooker = Palaquium gutta (Hook.) Baill., cf. Lam 1925, 28 and 1927, 387.
I. hexandra Griffith = Palaquium hexandrum (Griff.) Engler, cf. Lam 1925, 85.
I. krantziana Pierre = Palaquium obovatum (Griff.) Engler, cf. Lam 1925, 83.
I. laevifolia Thwaites = Palaquium laevifolium (Thw.) Engler, cf. Lam 1925, 107.
I. lamponga Miquel = Payena leerii (T. & B.) Kurz, cf. Lam 1925, 137 and 1927, 437.
I. lanceolaria Wight = I. lanceolata Wight f. anfractuosa, p. 557.
I. lanceolata Thwaites = Palaquium engleri H. J. Lam, cf. Lam 1925, 107.
I. lanceolata Wight, p. 557.
I. macrophylla de Vriese = Palaquium macrophyllum (de Vr.) Pierre, cf. Lam 1925, 106.
I. microphylla de Vriese = Payena microphylla (de Vr.) Pierre, cf. Lam 1925, 136 and 137.
I. montana Gamble, p. 571.
I. motleyana de Vriese = Ganua motleyana (de Vr.) Pierre, cf. Lam 1925, 122.
I. obovata Griffith = Palaquium obovatum (Griff.) Engler, cf. Lam 1925, 83.
I. pauciflora Thwaites = Palaquium pauciflorum (Thw.) Engler, cf. Lam 1925, 107.
I. perakensis King and Gamble, p. 577.
I. percha Hooker = Palaquium gutta (Hook.) Baill., cf. Lam 1925, 253 and 1927, 387.
I. perrottetiana DC., p. 563.
I. perrottetiana Wight = I. perrottetiana DC., p. 566.
I. polyandra Wight = Payena lucida (Wall.) DC., cf. Lam 1925, 145 and 146.
I. polyantha Kurz = Palaquium polyanthum (Wall.) Engler, cf. Lam 1925, 258.
I. polynesica Bentham and Hooker (= *Chrysophyllum polynesicum* Hillebrand) = Nesoluma polynesicum (Hillebr.) Baillon, p. 555.
I. puberula Miquel = Payena lucida (Wall.) DC., cf. Lam 1927, 431.
I. pulchra Burck = Payena acuminata (Bl.) Pierre ex Dubard, Rev. Gén. Bot. 20, 1908, 204, cf. Lam 1925, 140 and 142.
I. quercifolia de Vriese = Palaquium quercifolium (de Vr.) Burck, cf. Lam 1925, 53.
I. richii A. Gray = Burckella richii (A. Gray) H. J. Lam, cf. Lam in Blumea VI, 559.
I. rostrata Miquel = Palaquium rostratum (Miq.) Burck, cf. Lam 1925, 40.
I. rubiginosa Thwaites = Palaquium rubiginosum (Thw.) Engler, cf. Lam 1925, 107.
I. rufa King & Gamble = Madhuca sp.?, p. 578.
I. stocksii Clarke, p. 570.
I. sumatrana Burck = Payena acuminata (Bl.) Pierre ex Dubard, Rev. Gén. Bot. 20, 1908, 204, cf. Lam 1925, 140 and 142.
I. villosa Wight, p. 568.
I. wightiana DC. = I. lanceolata Wight, p. 562.
I. xanthochyma de Vriese = Palaquium xanthochymum (de Vr.) Pierre, cf. Lam 1925, 73.
I. zeylanica Jeuken, p. 567.

II. BURCKELLA PIERRE

by

H. J. LAM & P. VAN ROYEN

(Rijksherbarium, Leiden)

(Issued 15. V. 1952).

Trees with leaves crowded at tip of thick branchlets; stipules subulate or narrowly deltoid, caducous; leaves obovate or obovate-oblong, tertiary nerves ascending near the midrib, transverse near the margins of the leaf; flowers crowded at tips of branchlets, forming a pseudo-terminal, many-florous inflorescence; calyx with two whorls of two lobes each; corolla exsert, tube solid, pubescent without at apex, petals 8, imbricate; stamens 9—40, inserted in one or two rows in the throat; style subulate, exsert, glabrous; ovary glabrous, 3—8-celled, cells 1-ovuled, ovules attached at the apex of the central axis; sometimes an indistinct annular disc present; fruit large, often edible, crowned by the persistent style; fruit usually 1-seeded; seed ovoid with large to very large scar and apical hilum; testa thick, crustaceous; albumen none or membranous, if present especially around the radicle; cotyledons fleshy; radicle inferior, not exsert — 11 species distributed from the Moluccas to the Samoa and Tonga Islands.

The last revision of this genus was given by Lam in 1942. After a small but important publication of White (J. Arn. Arb. 31, 1, 1950, 104) and the investigation of some new collections it seemed appropriate to give a concise revision of this genus in preparation for the "Flora Malesiana". Some new species are described and of some old ones more details are given. The publications of Lam are abbreviated as follows:

Lam 1925 = The Sapotaceae, etc. of the Dutch East Indies, Bull. Jard. Bot. Bzg, sér. 3, 7, 1925, 112.
Lam 1927 = Further studies etc., Bull. Jard. Bot. Bzg, sér. 3, 8, 1927, 381.
Lam 1932 = Sapotaceae, in Nova Guinea 14, 4, 1932, 554.
Lam 1942 = A tentative list of wild Pacific Sap. etc., Blumea 5, I, 1942, 36.

Key to the species.

1.a. Leaves densely appressed pubescent beneath. (See also *B. obovata*) . . . 2
b. Leaves glabrous beneath 3
2.a. Stamens about 25; ovary 7- or 8-celled; leaves obovate, top retuse to crenate, 9—18 × 4—8 cm; secondary nerves 17—25. *New Guinea* . **7. B. polymera** v. Royen
b. Stamens about 40; ovary 4-celled; leaves obovate, top obtuse, 16—21 × 6—9 cm; secondary nerves 15—17. *Fiji* . . . **11. B. thurstonii** (Hemsley) H. J. Lam

3.a. Stamens 25 or more; secondary nerves about 25. *Moluccas to South Eastern New Guinea* . . . . **8. B. poolei** H. J. Lam
b. Stamens 20 or less 4
4.a. Secondary nerves 20—25. *Fiji* . . . . **5. B. multinervis** H. J. Lam
b. Secondary nerves 17 or less 5
5.a. Petiole of leaf 3—7.5 cm. *New Guinea*
3. B. macropoda (Krause) H. J. Lam, var. **macropoda**
b. Petiole 0.7—3 cm 6
6.a. Calyx of the flower glabrous, sometimes the inner sepals of the flower fimbriate at top 7
b. At least two sepals pubescent or densely appressedly haired, sometimes sparsely pilose, inner sepals not fimbriate at top (See, however, *B. obovata*) . . . 8
7.a. Secondary nerves 6—10; corolla up to 1.5 cm long; stamens up to 0.7 cm long; apex of leaf bluntly acuminate; pedicel 0.8—1.9 cm. *New Hebrides, Fiji*
1. B. brachypoda H. J. Lam
b. Secondary nerves 7—11; corolla up to 0.6 cm long; stamens up to 0.3 cm long; apex of leaf rounded; pedicel 0.8 cm long. *Tonga* . **9. B. richii** (Gray) H. J. Lam
New Guinea . . . . . **10. B. erythrophylla** H. J. Lam
8.a. Leaves 4—12 × 2.5—5 cm 9
b. Leaves 10—25 × 4.5—10 cm 10
9.a. Leaves obovate, base cuneate, tapering into a petiole, which is 1.5—3.5 cm long; calyx 0.5—0.6 cm; corolla 1.2—1.4 cm, petals 7. *Samoa, Tonga*
4. B. microphylla H. J. Lam & E. v. Olden
b. Leaves ovate or elliptic with a broad, abruptly narrowed base; petiole 0.5—0.9 cm; calyx 0.3—0.5 cm; corolla 0.6 cm, petals 8. *Fiji*
2. B. hillii (J. G. Baker) H. J. Lam
10.a. Secondary nerves 11—13, tertiary nervation distinct, prominent, with numerous nerves; leaves obovate, top shortly and bluntly acuminate, base cuneate, tapering into petiole which 2.5—3 cm long; inflorescences many-florous; calyx 0.5—0.6 cm; corolla 1.2—1.4 cm; ovary 4-celled; styles up to 2.5 cm long; pedicel of fruit densely appressedly pubescent, slender, 1.2—3.5 cm long. *Moluccas to Solomon Islands* . . . . **6. B. obovata** (Forster) Pierre
b. Secondary nerves 10—12, tertiary nervation indistinct or absent, with few nerves; leaves obovate to oblong-obovate, top rounded to retuse, base broad and gradually narrowed, petiole 2—2.8 cm long; inflorescences few-florous; calyx about 1 cm long, corolla unknown; ovary 5-celled; styles up to 4 cm long; pedicel of fruit glabrescent, stout, up to 2.5 cm long. *Fiji* . **3. B. macropoda** (Krause) H. J. Lam, var. **macrantha** (H. J. Lam) Lam & v. Royen

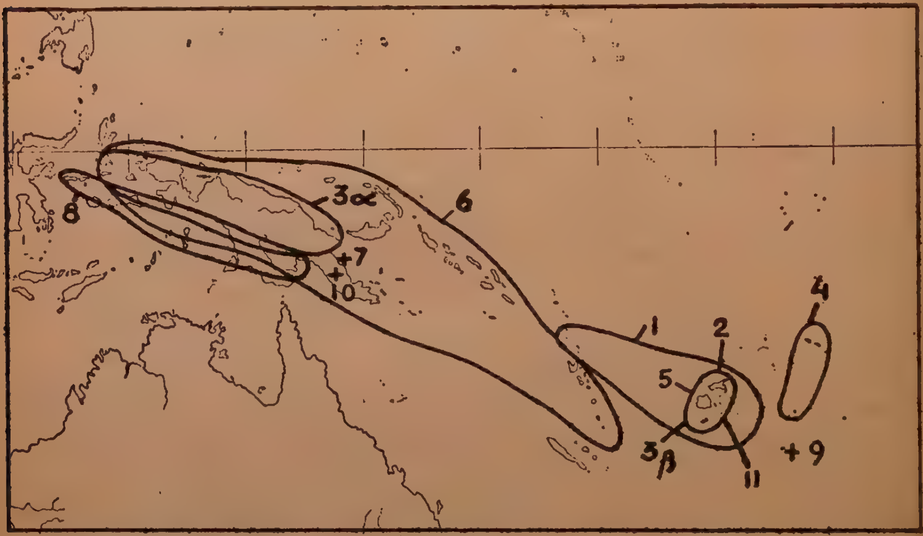
Affinities and distribution (cf. map).

In his paper of 1925, Lam followed Pierre as to the generic characteristics and limits of *Burckella*. These limits are admittedly vague, as seems to be a feature of almost the entire family of the *Sapotaceae*. *Burckella* is generally characterized by its often thick branchlets, the leaves conferted towards their tips, as well as by the congregation of flowers in the uppermost leaf-axils, the number of flower parts (S 4, P 8, A 9—40, G 3—8), and the type of pubescence of the corolla. From related genera (*Madhuca, Ganua, Payena,* in this order) it is geographically distinguished, being a truly Western Pacific genus, with a centre both in New Guinea and in the Fiji area, extending westward not farther than the Sula Islands and Ternate (Moluccas) and eastwards as far as Samoa and Tonga.

In *Burckella* two more or less distinct categories can be distinguished, viz., one with large leaves (9—26 cm), many secondary nerves (15—30) and a large number of stamens (25—40) in which *B. polymera, B. poolei, B. multinervis* and *B. thurstonii* are included, and a second category with mainly smaller leaves (4—12 cm) — except in *B. macropoda, B. brachy-*

poda and *B. obovata* (10—35 cm) — fewer secondary nerves (7—13) and fewer stamens (11—20). It should be remembered, that the number of stamens is thus far unknown in *B. richii* and *B. macropoda* var. *macrantha.*

In the first-mentioned category *B. polymera* and *B. thurstonii* are distinguishable from all other *Burckella* species by the pubescence of the leaves. In the second category a small-leaved group may be distinguished (4—12 cm long) next to a larger-leaved group (10—35 cm), the former including *B. microphylla, B. hillii* and *B. richii* (with *B. erythrophylla*), the latter comprising *B. macropoda* and its variety *macrantha,* and *B. obovata.*



Areas of *Burckella* species — 1. *brachypoda*; 2. *hillii*; 3. *macropoda,* α var. *macropoda,* β var. *macrantha*; 4. *microphylla*; 5. *multinervis*; 6. *obovata*; 7. *polymera*; 8. *poolei*; 9. *richii*; 10. *erythrophylla*; 11. *thurstonii.*

The lack of complete material in several species is the main difficulty in as exhaustively tracing the affinities as we should like to do. Due to the same cause we were sometimes unable to include a species for certain in the key, not being sure whether a given character is constant, e. g. the pubescence of the calyx was used as one clue in our key but it should be emphasized that it is by no means certain that this is the most natural one.

Regarding a geographical correlation, if any, with the taxonomically accepted subdivision of the genus, it must stated, in accordance with the rather vague specific limits, that such a correlation is not very clear. *B. obovata* extends its range from Ternate to the New Hebrides while at both ends a polymorphic group of species has arisen, viz., at the western end *B. macropoda* var. *macropoda* and *B. poolei,* both with a relatively large area and *B. polymera* and *B. erythrophylla* known from the type-locality only. If we compare this with the taxonomical subdivision given above, one finds that species of both categories are found side by side.

At the eastern end a similar polymorphic group with its centre around Fiji, Tonga and the Samoa Islands is found, including *B. brachypoda*, *B. hillii*, *B. microphylla*, *B. multinervis*, *B. macropoda* var. *macrantha*, and *B. thurstonii*. Here also the species of both categories are found together in one region. The small-leaved group of the second category is found for the main part in this region, but *B. erythrophylla* is found in the centre of the area of *B. obovata*. Possibly the last-named species is to be regarded as the oldest species while the other species might have sprung from it in two separate centra.

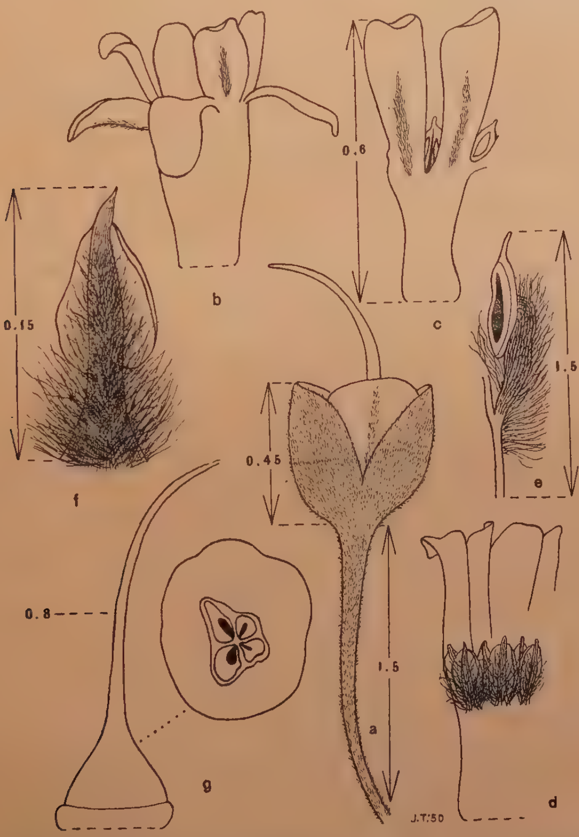


Fig. 1 — *Burckella hillii* (J. G. Baker) H. J. Lam — a. flower — b. corolla — c. corolla showing stamens — d. corolla, inner side — e. stamen aside — f. stamen dorsal — g. gynaecium (with transversal section of ovary).

1. B. brachypoda H. J. Lam, 1942, 36, f. 9. In the legend of the figure erroneously the name *B. macropoda* has been used.

Distribution: New Hebrides, Fiji.

2. B. hillii (J. G. Baker) H. J. Lam, 1942, 38 — *Payena hilli* J. G. Baker, J. Linn. Soc. 20, 1883, 368; mentioned as *P. hilli* sine aut. in J. Horne, A year in Fiji, 1881, 266; Hartog mss in sched., nomen nudum — *Fig. 1.*

Description of the type specimen:

Tree with slender, terete, glabrous and smooth branchlets (up to 0.2 cm thick), minutely ferrugineously pulverulent at innovations only. *Leaves* exstipulate, scattered or at least not densely conferted at tips of branchlets, thinly coriaceous, glabrous, oblong with more or less broad, abruptly contracted base and bluntly acute apex, 6—12 × 2—5 cm, petioles 0.5—0.9 cm, midrib distinctly prominent below, secondary nerves faint, about 10, straight and close to margin, widely arching, tertiary venation loosely reticulate with some stout nerves parallel to secondary nerves. *Inflorescences* in axils of upper leaves or leaf-scars, between foliage, 1—2-florous. Pedicels very slender, 0.5 mm thick and often curved downward, minutely pulverulent, 1—1.7 cm long, slightly broadened underneath calyx. *Calyx* in bud subglobose, when young 0.4—0.5 cm long, outer sepals densely appressedly pubescent with a rounded to subacute apex, inner ones with broad glabrous margins enclosing a narrow pubescent keeled centre, all sepals glabrous inside. *Corolla* subinfundibuliform, 0.6 cm long, tube glabrous, as long as the oblong lobes (4 outer and 4 inner ones), which bear for about $^2/_3$ of their length from base a narrow central slip of appressed hairs, for the rest glabrous outside, tips rounded. *Stamens* 11—13, about 0.15 cm long, inserted in two closely adherent whorls in corolla throat, insertions and the short filaments densely and coarsely pubescent, filaments flat at base, solid and thick at apex, even when, apparently, adult not longer than thecae which are glabrous and scarious, connective ending in a short glabrous acumen, in sicco dark brown as are connective and filaments. *Ovary* conoidal or semiglobular, glabrous, at its base surrounded by an annular and somewhat undulated disk, 4-celled (a single one examined), subabruptly contracted into a more or less curved style, protruding about 0.5 cm from corolla. *Fruit* unknown.

FIJI — Rabi, near Vanua Levu: *J. Horne 484, type specimen* (K), tree 40 ft or so in height, bark dark brown, fl. small and greenish, March 1878.

Remarks: It is certainly surprising that this remarkable species never has been collected again after 1878. Its most striking features are the short and stout filaments, the small thecae, and the small number of stamens (which are not sessile as is mentioned by Baker). For the rest it shows all characters typical for the genus (venation, petals partly hairy outside and pubescent in the throat, 4-celled ovary).

It seems most related with *B. obovata,* from which it differs by the small oblong leaves, the short filaments and the small number of stamens. *B. obovata* has 9—16 stamens; most other *Burckella* species possess a far greater number and for *B. kajewskii,* which is considered a synonym of *B. obovata,* 16 subsessile stamens are reported. There are no indications on the sheet of the type specimen that the corolla lobes should be "purplish brown" as is mentioned by Baker.

Its relation is probably with *B. microphylla* from Tonga and Savaii, from which it differs by the broader leaf-base, the slightly longer leaves and the distinctly smaller flowers with broad anthers on short solid filaments.

Distribution: Fiji.

3. **B. macropoda** (Krause) H. J. Lam, var. **macropoda,** Lam 1932,

554, t. 99 — ? *Burckella may* (Becc.) Pierre, Not. bot. Sapot., 1890, 4; Dubard, Rév. Gén. Bot., 20, 1908, 201; Lam 1925, 118; Lam 1927, 423; Lam 1932, 566 — ? *Bassia may* Becc. msc. ex Pierre, l. c. 4 — ? *Illipe may* (Becc.) Engler, Nat. Pfl. Fam., Nachtr., 1897, 272; Boerlage, Handb. Fl. Ned. Indië 2, 1, 1891, 310; Krause, Engl. Bot. Jahrb. 58, 1923, 468 — *Illipe macropoda* Krause, l. c. 466 — *Burckella oxycarpa* H. J. Lam, 1925, 113, f. 53; Lam 1927, 422 — *Burckella ovalifolia* H. J. Lam 1927, 422, f. 9.

The following may be added to Krause's description:

Carr 15783: Leaves glabrous, largest width near apex, from there gradually and regularly narrowing towards acute base, apex rounded or very shortly and bluntly acuminate or subacute, conferted at tips of thick and rugose branchlets, 7.5—19.5 × 2.7 cm, petioles 1.5—4.7 cm, midrib strongly prominent below, secondary nerves 10—15, faint and hardly more conspicuous than the loosely reticulate tertiary venation, angle rather large, c. 75°. *Inflorescences* in the axils of small scales above leaves; the naked parts of branchlets more or less clearly show zones with leaf-scars and a short distance above these, zones of flower-scars between the more or less smooth internodes: cf. Lam 1932, t. 99. Pedicels slender, glabrous, 2—2.8 cm long. *Calyx* hard and broad, 0.7—1 cm long, glabrous but for some coarse hairs on margins of tips of inner sepals. Sepals broadly obovate, ovate or subtruncate, sometimes bluntly subapiculate, 0.2—0.4 cm long. *Corolla* c. 0.7—1 cm exsert from calyx, c. 1—1.3 cm long, the tube 0.4 cm, the latter densely appressedly pubescent outside (except for the lower third), as are the middle portions of the petal-bases; lobes probably 8 (all corollas were insect-eaten), imbricate, ovate, with rounded tip and contracted base, c. 0.7 × 0.55 cm, tube c. 0.5 cm, glabrous inside, except at throat. *Stamens* small, not exsert, number uncertain but probably about 16, inserted in the upper half of corolla tube; filaments stout and densely pubescent, about 0.2 cm long, anthers glabrous, with the acute 0.1 cm long connectival acumen 0.4 cm long. *Ovary* glabrous, together with basal disc 0.15—0.2 cm high and slightly more in diam., 4- or 5-celled. Style slender, 4—4.2 cm long, 3—3.2 cm exsert from calyx. *Fruit* unknown.

Clemens 3202 and *8084* are undoubtedly conspecific, but the leaves are broader. In *3202* they are obovate with a rounded apex and acute base, 7—13 × 3.7—7 cm, petioles 1.7—3.5 cm, lateral nerves 11—14. Flowers as in *Carr 15783*, but the pedicels 1.7—3.2 cm, corolla-lobes 8, 0.9—1.1 × 0.6 cm; stamens 18—21 (insect-eaten), ovary 4-celled, style up to 3 cm long.

In *Clemens 8084* the leaves are narrowly oblong with rounded tips and acute base, 10—25 × 4.8—9 cm, petioles 2.5—6.5 cm, lateral nerves 12—17; flowers as in preceding specimen.

NEW GUINEA — Papua, Isuarava, c. 1050 m, in secondary forest: *C. E. Carr 15783* (L, SING), tree 24 m, fl. brown, Febr.; Morobe-district, Sattelberg, hill forest below cabin: *Clemens 3202* (A, L), tall tree, diam. breast high 1—2 ft, fl. cream white, May; ibidem, hill trail above watersupply, open forest, 3300 ft: *Clemens 8084* (A, L), big tree, diam. 15—18 inch, infl. green, abundant in ample leaved terminals, April.

The type specimen (*Schlechter 17293*) has probably been destroyed in the Berlin bombardment; no duplicate types are known. Judging from the figure in Lam's paper of 1932 which was made after the (poor) type specimen and from Krause's not very complete description, the identification of the above-named specimens of which ample material was available, seems fairly certain. In case of a total loss of the type specimen, *Carr 15783* is recommended to serve as a neo-type.

Remarks: The species seems very constant in its flower-characters but rather variable as to its leaf-shape and size. This implies that *B. oxycarpa* could not be maintained as a species.

To *B. macropoda* the mysterious *Burckella may* (Becc.) Pierre may possibly be added. The last name is an illegitimate combination based upon a "nomen nudum" (*Bassia may* Becc. msc., New Guinea). No material is known, but in the Paris herbarium there is a picture with this name which pretty well agrees with *B. macropoda,* but for the emarginate leaf-tips. This picture shows some fruits, which were thusfar unknown: a young one about 4 × 2.3 cm somewhat pointed at the top and with the remainder of a style, and an, apparently, mature one of about 11 × 6.5 cm, pyriform and with a shortly and bluntly mamillate apex. Both are smooth, not furrowed, as in *B. obovata.* No seeds are known, but the ovary is 4-celled and the dimensions of the calyx agree with those of *B. macropoda.*

Distribution: New Guinea.

Var. **macrantha** (H. J. Lam) Lam & v. Royen, nov. comb. — *Burckella macrantha* H. J. Lam, 1942, 39, f. 9.

This variety differs from the type-variety *macropoda* in the calyx which is densely appressedly pubescent. No other details giving any clue to separate it as a distinct species, it is matter of the taxonomical value to be attributed to this character whether its specific or even varietal rank should be maintained. Also on account of the geographical distribution of both varieties it seems preferable to provisionally keep the two groups separate as varieties.

Distribution: Fiji.

4. **B. microphylla** H. J. Lam & E. van Olden, Bernice P. Bishop Museum Bull. 154, 1938, 34, pl. 1 B; Lam 1942, 39.

Distribution: Samoa, Tonga.

5. **B. multinervis** H. J. Lam, nov. sp. — *Fig. 2.*

Arbor alta, ramulis crassis in sicco rugosis glabris. *Folia* glabra, ad apices ramulorum conferta, chartacea, in sicco brunneo-viridiuscula ovata vel oblonga vel paulo obovata, apice obtusa vel subrotundata, basi obtuse vel late acuta, 14—26 cm longa, 6.7—9.2 cm lata, petiolo forti, 2.3—4.2 cm longo; costa media subtus valde prominens, nervi secundarii graciles 20—25, angulo 70—90° de costa adscendentes, prope margine tenuiter arcuatim conjuncti, tertiarii laxe reticulati, generatim transversi. *Inflorescentiae* floresque ignoti. *Fructus* supra folia inserti, pedicellis solidis 2.5—3.5 cm longis, petiolis subaequicrassis. *Calyx* durus, c. 1 cm longus, extus dense sericeus, intus glaber, sepala interiora margine fimbriata, omnia ovata, 0.7—0.8 cm longa, 0.6—0.7 cm lata. Fructus novelli 4-loculati, maturi monospermi, elongato ovoidei, acutati, c. 6 × 2.3 cm, glabri, in sicco sulcati, apice contracti, styli rudimento coronati. Seminis unici testa (normalis?) tenuis, c. 0.6 mm crassa, pro dimidio fructus axi connata, cicatrice probabiliter latissima. Embryo exalbuminosum, cotyledones planae crassae.

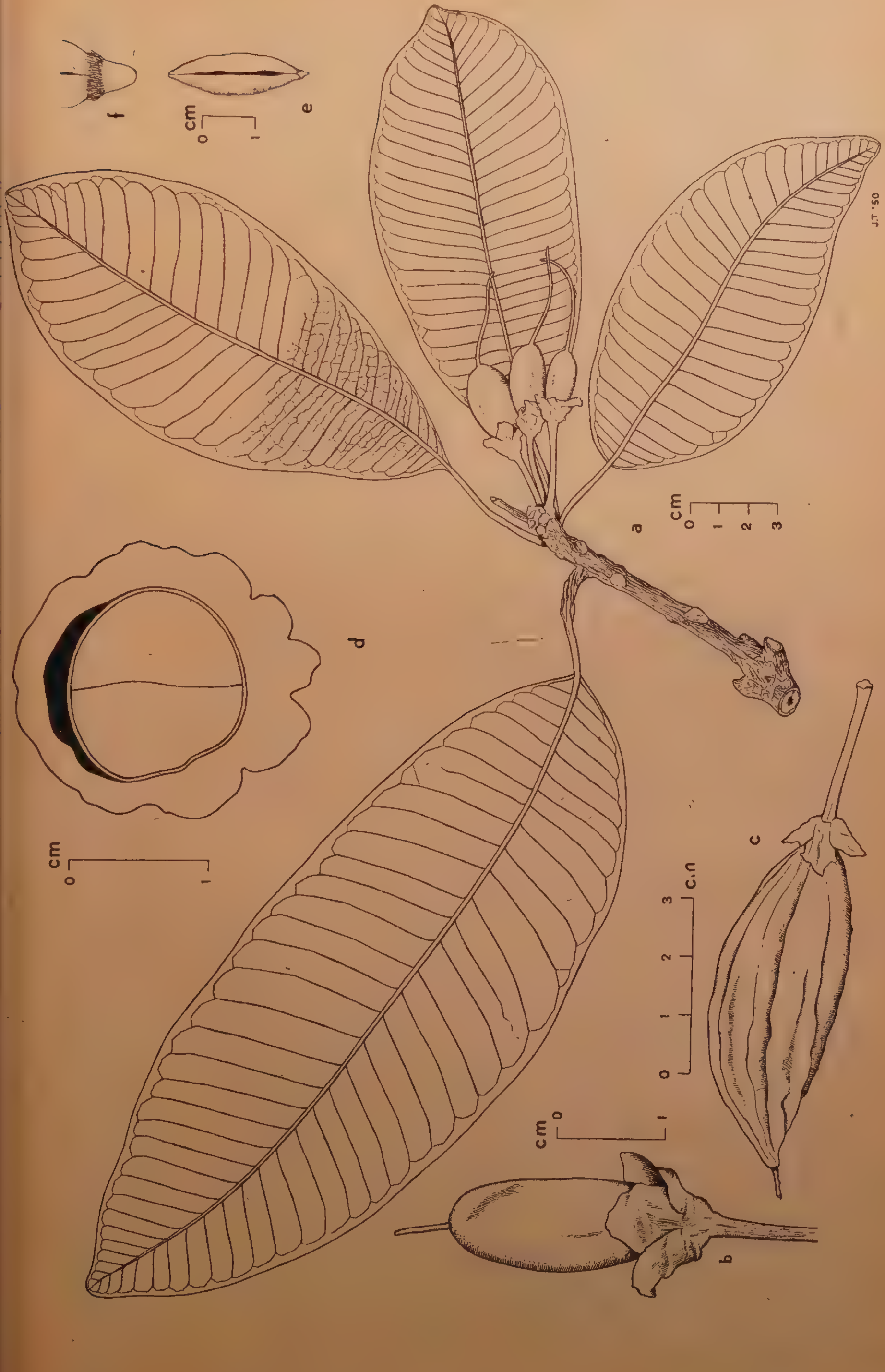


Fig. 2 — *Burckella multinervis* H. J. Lam — a. branchlet with leaves and fruits — b—c. fruit, juvenile an mature — d. fruit transverse — e—f. seed.

FIJI — Viti Levu, Nandronga & Navosa (Tholo North), northern portion of Rairaimatuku Plateau, between Nandrau and Rewasau, 725—825 m alt., in dense forest: *A. C. Smith 5631, type specimen* (L, US), tree 25 m high, with abundant latex, July 31—Aug. 11, 1947; with attached young and detached mature fruits.

Remarks: Undoubtedly related to the large-flowered *B. macropoda* but differs in the dense secondary nervation.

Distribution: Fiji.

6. **B. obovata** (Forster) Pierre, Not. bot. Sapot., 1890, 4; Dubard, Rév. Gén. Bot. 20, 1908, 201; Lam 1925, 118; Lam 1932, 555; Lam 1942, 40; White, J. Arn. Arb. 31, 1, 1950, 104 — *Bassia obovata* Forster, Fl. Ins. Austr. Prodr., 1786, 35, no 200; Guillaumin, J. Arn. Arb. 13, 1932, 16 — *Bassia (?) cocco* Scheffer, Ann. Jard. Bot. Bzg 1, 1876, 34; Burck, ibid. 5, 1886, 46 (err. cocca) — *Payena bawun* Scheffer, l. c. 133; Burck, l. c. 58; Engler, Notizbl. Berl. Bot. Garden 1, 1895, 102; Schumann & Lauterbach, Fl. Deutsch. Schutzgeb. Südsee 1901, 493 — *Lucuma cocco* v. Mueller, Descr. Not. Pap. Pl. 5, 1877, 100 — *Bassia (Illipe) erskineana* v. Mueller, Vict. Chem. and Druggist, April 1885; idem, Descr. Not. Pap. Pl. 6, 1885, 12; idem, Bot. Centralbl. 23, 1885, 224; idem, Gard. Chron. 6, VI, 1885, 734 — *Bassia hollrungii* K. Schum., Engl. Bot. Jahrb. 9, 1888, 214 — *Illipe hollrungii* K. Schum. & Hollrung, Fl. Kais. Wilh. Land, 1889, 107; Warburg, Engl. Bot. Jahrb. 13, 1891, 401; Boerlage, Handl. Fl. Ned. Ind. 2, 1, 1891, 310; Schumann, Notizbl. Bot. Gart. Mus. Berl. 1, 1895, 55; Engler, Nachtr. Nat. Pfl. Fam. 1897, 272; Schumann & Lauterbach, l. c. 493; Krause, Engl. Bot. Jahrb. 58, 1923, 465 — *Burckella cocco* (Scheffer) Pierre, l. c. 3; Dubard l. c. 201; Lam 1925, 115; Lam 1927, 423; Lam 1942, 38; Heyne, l. c. 1229 — *Schefferella bawun* (err. bawum) Pierre, l. c. 5 — *Illipe cocco* (err. cocca) Engler, Bot. Jahrb. 12, 1890, 509; Boerlage, l. c. 309; Engler, Nat. Pfl. Fam. 4, 1, 1897, 134; Krause, l. c. 466 — *Burckella hollrungii* (Schum.) Pierre, l. c. 4; Dubard, l. c. 201; Lam 1925, 117; Lam 1927, 423; Lam 1932, 555 — *Burckella erskineana* (F. v. Mueller) Pierre, l. c. 4 (nomen); Dubard, l. c. 201; Lam 1925, 117; Lam 1927, 423; Lam 1932, 556 — *Illipe erskineana* (F. v. M.) Engler (err. erskieana), l. c. 1890, 509; Boerlage, l. c. 310; Engler, l. c., 1897, 272; Krause, l. c. 466 — *Illipe bawun* (Scheff.) Baill., Hist. Pl. 11, 1892, 265; Engler, l. c. 1897, 272; Krause, l. c. 466 — *Payena mentzelii* K. Schum., Notizbl. Berl. Bot. Gart. 1, 1895, 102; Schum. & Laut., l. c. 493; idem, Nachtr. Nat. Pfl. Fam., 1923, 465 — *Illipe obovata* (Forst.) Engl., l. c. 1897, 272 — *Madhuca obovata* Macbr., Contr. Gray Herb., N. S. 53, 1918, 18 — *Illipe mentzelii* (K. Schum.) Krause, l. c. 465 — *Bassia bawun* (Scheff.) Guill., Journ. Arn. Arb. 13, 1932, 16 (sub *Bassia kajewskii* Guill.) — *Bassia kajewskii* Guill., l. c. 15 — *Burckella kajewskii* (Guill.) H. J. Lam, 1942, 39. (Full synonymy).

Type specimen of *Burckella obovata* (Forster) Pierre is *Forster s. n.* (K) from Tana; *Hollrung 198* (B) of *Bassia* and *Illipe hollrungii*; *Teysmann s. n.* (L) of *Bassia cocco*; *Teysmann s. n.* (L) of *Payena bawun*; *Mentzel 13* (B) of *Payena mentzelii*.

In various publications and in annotations on labels the synonymy given above has already been hinted at. In the extensive annotations of Pierre, accompanying the Paris specimens of *B. erskineana*, the writer remarks: "Le

B. erskineana, le B. obovata et le B. cocca (sic) pourraient être la même espèce. Par leurs feuilles et leurs fleurs rien ne l'empêche, mais les graines du B. erskineana sont plus petites que celle de B. cocca. Celles de B. obovata sont inconnues". White in 1944 regarded *B. obovata* as "a somewhat polymorphic species widely spread over the Pacific" and reduced *Burckella cocco, B. hollrungii* and *B. kajewskii* to synonyms of *B. obovata.* Lam in 1942 already hinted that these 4 species could be reduced to one.

In the new delimitation the leaves in this species are mostly more or less broadly obovate with rounded top and acute base, but those with acute and even acuminate apices and intermediate ones are not rare, e.g. *Weinland s. n.*, apex subacute, *Atasrip 149,* leaves oblong and in *Kajewski 2399* leaves obovate to oblong-lanceolate with subacute or slightly bluntly acuminate apex, *Kajewski 2205* with oblong leaves, shortly more or less acutely acuminate. The narrowest and most pointed leaves are found in the Paris specimen of *B. erskineana* which are perfectly agreeing with those of *Stoddard 28* except in as far as in the last-named specimen the leaves are glabrescently pubescent on either side. These narrow leaves could be a reason for maintaining *B. erskineana* as a separate species, but on account of the many transitional forms between the leaves of *B. obovata* and *B. erskineana* it seems logical to combine the two and there seems to be no reason even to distinguish varieties or forms.

A similar variability is found in the flowers though chiefly restricted to the pubescence of the corolla. The indumentum may be confined to a narrow and more or less interrupted belt around the upper part of the tube, leaving the base as well as the petals entirely glabrous (e. g. in *Kajewski 2399*) or it may be more continuous and extending both downwards and upwards on the bases and along the margins of the petals, as is, in various degrees, the case in the type of *Bassia bawun,* in *Weinland s. n.,* the type (?) of *Burckella hollrungii* and markedly, in *Stoddard 28.* For the rest, the flowers are of the same type, cream-coloured or whitish, with slender, graceful pedicels and appressedly pubescent calyces, 0.3—0.5 cm long and cleft halfway down, the entire flower about 1—1.2 cm long, with mostly 8 petals and (9—?) 16 (—18) stamens with pubescent filaments and a 4—6-celled glabrous ovary. Also on these grounds, as well on those of the leaves, a subdivision of the species seems impossible. The only uncertainty remains in the fruit. This is according to the labels and the descriptions, large (4—5 inches long), pyriform or applelike globose, with furrowed pericarp, and edible. The white flesh is said to be delicious. A fruit in dry state, accompanying *Kajewski 2399* is, in spite of the annotations on the label narrow and pointed at either end and one-seeded; it is doubtful whether it belongs here and it rather reminds the equally detached fruits of *B. multinervis* (see there).

The scar of the seed is said to occupy almost one half of the surface and the back is said to be rounded in a 1-seeded fruit of *B. cocco.* However, seeds, probably from more-seeded fruits, are found to be more or less compressed and keeled at the dorsal side, the scar occupying not more than about one third of the surface. The seeds are 4—6.5 cm long. Albumen none or very little around the base of the embryo.

MOLUCCAS — Halmaheira-group, Kasiruta, alt. 100 m: *de Haan 103* (= *N.I.F.S. bb 23222*) (BO, L), fl. Sept.

NEW GUINEA — Dinner Island: *H. D. Forbes 12* (BRI, L), large tree, fl. cream white with pink, Sept.; lowlands of New Guinea: *W. Mc Gregor s. n.*, (Melb.-Phyt.), large flowering tree — Papua, South Cape, *Rev. W. Gill s. n.* (P, some leaves, 1 fragment of branchlet, 1 dissected seed and some dito flowers); Port Moresby: *W. G. Lawes A° 1884* (P, herb. Pierre 5097, 1 leaf, 1 fragment of branchlet and some dissected seeds); Kaiser Wilhelmsland, Finschhafen: *Weinland s. n.* (B, L), fl. fr.

SOLOMON ISLANDS — Banika Isl., *C. H. Stoddard 28* (A), 1944 — Ulava Isl., common in coastal rain forest: *L. J. Brass 2985* (A), large tree with brown, furrowed bark, lvs glossy, fr. large, on 8. 10. 1923, ribbed, apiculate, pale green with paler green blotches and large warts, nat. name: lao — Bougainville, Maimaiomino: *Kajewski 2205*, fl. fr. Sept. (A, L) — Guadalcanal, Berande river: *Kajewski 2399* (A, L, S), fl. fr. Jan.

Distribution: Accepting that the above-named combination of synonyms is correct *B. obovata* is now known from the Moluccas (Kasiruta), New Guinea (Manokwari, Finschhafen, Huon-gulf, Dinner Island, Tami Island, South New Guinea), the New Hebrides (Tana, Aneityum, Efate, Banks), the Bismarck-archipelago, and the Solomons (Bougainville, Guadalcanal, Banika, Ulava, Malaita, New Georgia).

7. **B. polymera** van Royen, nov. sp. — *Fig. 3* — Arbor alta. Ramuli crassi aspera glabri. *Folia* satis crassa fragilia, supra glabra, subtus ferruginei-sericea, obovata, apice retusa ad crenata, basi cuneata in petiolum decurrentia, 9—18 cm longa, 4—8 cm lata, petiolis 1—4 cm longis, subpilosis, 4-sublateribus; costa media subtus prominens, supra paulo sulcata, nervi secundarii tenues, utrinque 17—25, angulo 60° de costa ascendentes, margines versus (c. 3 mm) furcati, arcuatim conjuncti, tertiarii satis conspicui, reticulati, saepe apice aliqui distincte secundariis paralleli. *Inflorescentiae* fasciculatae, pauciflorae, supra folia confertae; pedicelli dense sericei, 1—3 cm longi. *Sepala* 2 + 2, extus dense sericea, intus glabra, exteriora late deltoidea, c. 0.6 cm longa, c. 0.8 cm lata, interiora late cordata, obtusa, c. 5 mm longa et lata. *Petala* 7 vel 8, orbicularia ad deltoidea, basi subcordata, extus basi sericea, intus sparse pilosa vel basi regione angusta pilorum sericeorum suffulta, 0.4—0.6 × 0.3—0.5 cm, margine undulata. *Stamina* c. 25, 2-serialiter inserta, 3—4 mm longa, apice filamentis et antherae pilis paucis longis instructa, antheris sagittiformibus, longe acuminatis dorse pilis suffultis, granulis pollinis globosis, 4-poratis; ovarium glabrum, 7- vel 8-loculare, c. 0.4 cm diam, in stylum subulatum, c. 0.4 cm longum abrupte contractum. Fructus tantum juveniles noti, ellipsoidei, sparse pilosi.

NEW GUINEA — Buna hinterland, about 9 miles N of Embi-lakes, in rain forest, alt. 50 ft: *L. S. Smith 1258* (BRI, L), tree 150 ft, fl. white, fr. pale brown, March, leaves brownish beneath.

Remarks: This species is provisionally placed under *Burckella* since its ovary is 7- or 8-celled (in other species 3—6-celled). In this character it obscures the limits of the genus towards *Madhuca*. Fully grown fruits being unknown, which could give it its final status, the species is, on account of the venation, the terminal cluster of flowers and the pubescence of the corolla, inserted in *Burckella*.

In the number of secondary nerves *B. polymera* agrees with *B. multinervis*, from which it differs in the ferruginous-sericeously haired lower side of the leaf. This character *B. polymera* has in common with *B. thurstonii* and *B. obovata*. From the former it differs in the fewer stamens and the retuse to crenate top of the leaf, with appressed indumentum. From *B. obovata* it differs in the more numerous secondary nerves and stamens and the indumentum.

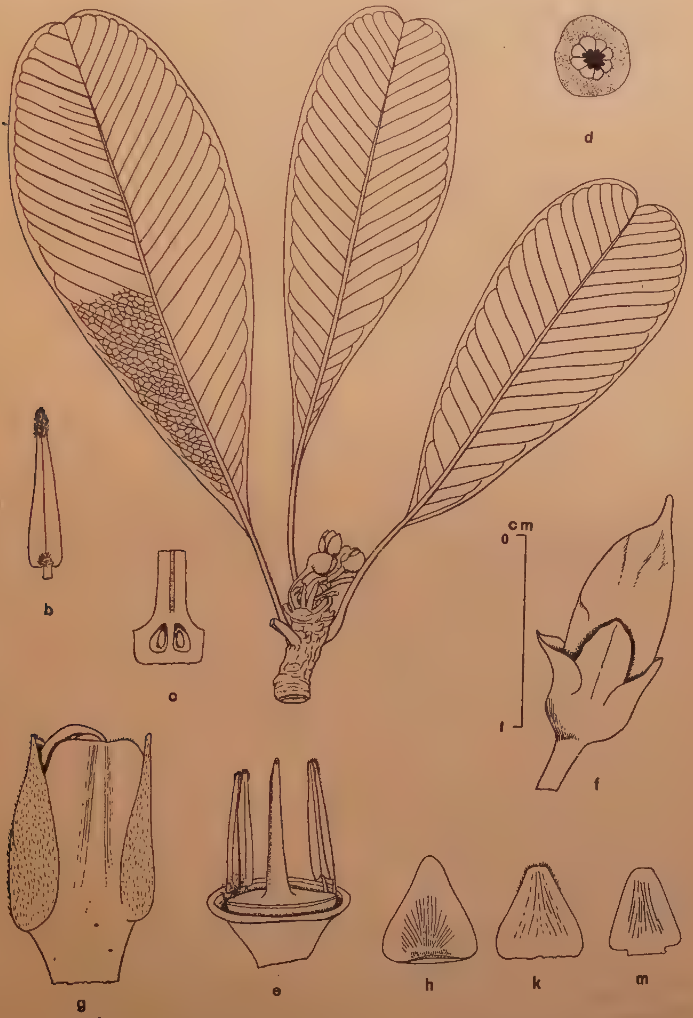


Fig. 3 — *Burckella polymera* v. Royen — a. habit (about one third) — b. juvenile stamen — c. longitudinal section of ovary — d. cross-section of ovary — e. juvenile flower — f. young fruit — g. flowerbud (4 ×) — h. inner surface of petal — k. sepal of outer whorl, outside — m. sepal inner whorl, outside.

8. B. poolei H. J. Lam, 1932, 555—556, t. 102.

Additions to the description of the type:

Leaves 12—30 cm long; secondary nerves 19—26; juvenile calyx densely appressedly sericeous; corolla lobes 8, spathulate, obtuse, known young only, densely hairy at top, slightly fimbriate in the upper part of the margin; stamens about 30, in 2 series, known young only; ovary 4- or 5-celled.

MOLUCCAS — Sula Islands, Mangoli, alt. 250 m: *N.I.F.S. bb 29916* (BO, L), young flowers and fruit, Oct.; ibidem, Taliabu, alt. 25 m: *N.I.F.S. bb 29928* (BO, L), Oct.; ibidem, Taliabu, alt. c. 25 m: *N.I.F.S. bb 29931* (BO, L), Oct. — Aru Islands, alt. 5 m: *N.I.F.S. bb 25312* (BO, L), May.

NEW GUINEA — Mimika district, Anidua (Uta), alt. 5 m: *Lundquist 200* (= *N.I.F.S. bb 32919* (BO, L), tree 22 m high, 35 cm diam., nat. name: javare etepako.

Distribution: Moluccas to South Eastern New Guinea.

9. B. richii (Gray) H. J. Lam, nov. comb. — *Isonandra* (?) *richii* Gray, Proc. Am. Ac. Arts and Sc. 1861, 327; Lam 1925, 259 — *Bassia retusa* Rich. ex Gray l. c. 327 (nomen).

Additions to the description of the type:

Leaves 6—8 × 3.5—4.5, elliptic, with rounded apex, glabrous. Secondary nerves faint, 7—11, angle c. 70°. Pedicel 0.8 cm, calyx glabrous, 0.45 cm long. Parts of corolla c. 0.6 cm long (tube and petal), glabrous outside, filaments densely hairy, 0.1 cm, anthers glabrous, narrow, 0.2 cm.

Remarks: This species, although incompletely known, could not be identified with any of the known species and is therefore probably a separate one. It is surprising, however, that it should not have been collected again after 1862. It seems to belong to the group of *B. microphylla* and *B. brachypoda*. From *B. microphylla* (Samoa) it differs in its broader leaves with broadly rounded apex, its much shorter pedicels (in *B. microphylla* 1.5—3.5 cm) and its slightly smaller calyx and much smaller corolla. From *B. brachypoda* (Banks Isl., Fiji) it is distinguished by its rounded leaf-tip and its much smaller flowers.

A specimen in Florence Herbarium (Labillardière s. n.), with flowers and fruit, is undoubtedly conspecific with this species, but the label bears the locality: Amboina. It is not impossible that this specimen has been wrongly labeled.

TONGATABU: U.S. Explor. Exp.: *Wilkes s. n.* (US), *type specimen.*

Distribution: Tonga Islands (Tongatabu).

10. B. erythrophylla H. J. Lam, 1932, 554, t. 100.

Originally we were inclined to include this species in the synonymy of *B. richii* since we were unable to detect any adequate differences between the two species. The incomplete knowledge of particularly *B. erythrophylla*, however, together with the large distance between the two localities induced us to provisionally maintain *B. erythrophylla* as a distinct species.

Distribution: South Eastern New Guinea.

11. B. thurstonii (Hemsley) H. J. Lam, 1925, 259; idem, 1927, 423; Gillespie, B. P. Bish. Mus. Bull. 74, 1930, 12, f. 13 — *Bassia thurstonii* Hemsley, Hooker Icon. Pl. 26, 1899, t. 2569.

Distribution: Fiji.

Excluded species.

12. B. amicorum (A. Gray) H. J. Lam, 1942, 41 (is a mystification).

13. B. pachyphylla (Krause) H. J. Lam, 1932, 555, t. 101 — *Illipe pachyphylla* Krause, 1923, 467 = *Ganua pachyphylla* (Krause) H. J. Lam.

List of collectors' numbers.

(The numbers between brackets indicate the number of the species)

Brass 2985 (6); Carr 15783 (3); Clemens 3202 (3); 8084 (3); Forbes 12 (6); Gill s.n. (6); de Haan 103 (6); Horne 484 (2); Kajewski 2205 (6); 2399 (6); Lawes A^{0} 1884 (6); Lundquist 200 (8); Mc Gregor s.n. (6); N. I. F. S. bb 23222 (6); bb 25312 (8); bb 29916 (8); bb 29928 (8); bb 29931 (8); 32919 (8); Schlechter 17293 (3); A. C. Smith 5631 (5); L. S. Smith 1258 (7); Stoddard 28 (6); Weinland s.n. (6); Wilkes s.n. (9).

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III. MIMUSOPS L.

by

P. VAN ROYEN

(Rijksherbarium, Leiden)

(Issued 15. V 1952).

Trees; leaves with caducous stipules; tertiary nervation descendant but usually lax and irregular; inflorescences clustered, axillary, many-florous; calyx with two rows of four lobes each; corolla 8-merous, each lobe with 2 dorsal segments as long as itself; stamens epipetalous, 8, in the same row as the 8 alternipetalous staminodes; ovary usually 8-celled; cells 1-ovuled, ovules anatropous, attached at the base; fruit a berry, 1—2-seeded; seeds with a small, circular, basal scar, in which the hilum and the micropyle are placed close to one another; albumen abundant; cotyledons thin, foliaceous; radicle long, cylindrical, exsert — About 30 species in all tropical countries, except in America.

In 1925, Lam (Bull. Jard. Bot. Bzg, sér. 3, 7, 1925, 235—237) described of *M. elengi* three varieties, var. *typica*, var. *parvifolia* and var. *brevifolia* and a forma *longepedunculata* in the type-variety. As was pointed out already by him, the differences between the two new varieties are slight, if existing at all. As those between *M. elengi* and *M. parvifolia* were obscured by many intermediate stages Lam was forced to consider the latter a variety of the former. Studying the more abundant material at our disposal it becomes clear that *M. elengi* is an extremely variable species in which it is impossible to distinguish varieties or forms. However, it must be pointed out that in the western parts of the Archipelago the leaves are large (up to 18 cm long), whereas they are decreasing in size towards the east, ending in the small leaves of the former species *M. parvifolia* (up to 6 cm long).

MIMUSOPS L., Nov. Gen. Pl., 1747, and Spec. Pl. ed. 1, 1753, 349; Lam 1925, 234; Lam 1927, 479; Lam 1932, 568.

Mimusops elengi L., l. c. 1753, 349; Lam 1925, 234; Lam 1927, 479—480; Lam 1932, 568 — *Mimusops parvifolia* R. Br., Lam 1925, 235 — *M. elengi* L, var. *typica*, var. *parvifolia* (R. Br.) Lam, var. *brevifolia* Lam and *M. elengi* L, var. *typica*, forma *longepedunculata* (Blume in Burck) Lam, l. c. 1925, 235—238.

INDIA — Travancore, Quilon: *Meebold 12735* (S), fl.; Dheradun: *Singh 13* (S), fl. fr. Sept. & Nov.; Sagar Maisar: *Meebold 9652* (S), fl. Oct.

SIAM — near Wangka: *Kostermans 730* (L), fl. May; Bangkok, *Zimmerman 47* (S), fl.; ibidem: *Zimmerman 161* (S); Kokkine, Rangoon: *Parkinson 14045* (S), fl. March.

MALAYA — Selat Panchor, Pulau Langkawi: *Henderson 21369* (L), Nov.; ibidem, Langkawi, Pulau Dayang Bunting: *Corner 38141* (L, SING), Nov.

Sumatra — Palembang: *Praetorius s.n.* (L), fl.; Blalauw: *Forbes 1939* (BZ, L), fl. fr.; Atjeh, Kp. Sigleng: *Asdat 154* (BZ, L), fl. Aug.

Java — Pandeglang: *For. Res. Inst. Ja 4683* (BZ, L), fl.; ibidem: *For. Res. Inst. Ja 4574* (BZ, L) fl. July; Djombang: *Voogd 961* (L), vern. name: tandjung, fl.; Semarang, P. Karimundjawa: *Karta 169* (BZ, L), fl..

Borneo — Martapura: *Korthals s.n.* (L); without loc.: *Korthals s.n.* (L); Bahaun Kahajan: *v. Wijk 66* (BZ, L), fl. Sept.

Celebes — Kendari: *Kjellberg 529* (BZ, L), fl. Febr. — Menado, Kolaka, Batubangga: *N.I.F.S. bb 32328* (BZ, L), fl. Aug.; Parigi near Pegiati: *N.I.F.S. bb 17508* (BZ, L), June; Gorontalo near Hangata: *N.I.F.S. bb 17334* (BZ, L), fl., nat. name: toto (Gorontalo); Mongondou, Tuntung: *N.I.F.S. 13743* (BZ, L), nat. name: molosiggo; Bolaäng Mongondou: *Politon 92 (= N.I.F.S. bb 32488)* (BZ, L), April Boalema Agoni: *N.I.F.S. bb 19395* (BZ, L), Dec.; Tondano, Lembekisland: *N.I.F.S. bb 17038* (BZ, L), Aug.; Boalema near Bilatto: *N.I.F.S. bb 17211* (BZ, L), fl. Oct., nat. name: toto (Gorontalo); ibidem: *v. Gabel 33 (= N.I.F.S. bb 32527)* (BZ, L), Aug.; ibidem: *v. Gabel 29 (= N.I.F.S. bb 32364)* (BZ, L), fr. Aug.; ibidem, *v. Gabel 2 (= N.I.F.S. bb 19395)* (BZ, L), Dec.; Poso, Kotamboa (Mauroto): *N.I.F.S. bb 19638* (BZ, L); ibidem: *N.I.F.S. bb 31487* (BZ, L), Febr.: without any details: *Forster 38* (L) — Banggai: *N.I.F.S. bb 31833* (BZ, L), fr. Nov.; ibidem: *N.I.F.S. bb 31889* (BZ, L), fl. April; ibidem: *N.I.F.S. bb 31860* (BZ, L), March — Muna, Loya: *N.I.F.S. bb 21791* (BZ, L), fl. Jan.

Philippines — Palawan: *Fenix 15504* (L, PNH), fl. — Mindanao, distr. Zamboanga, *Foxworthy c.s. 13435* (L, PNH), fl. May/June; ibidem, distr. Cotabato: *Tarrosa c.s. 18798* (L, PNH), May/June — Luzon: *Forestal 1599* (L, PNH); ibidem, near Manilla, *Merrill 2773* (L, PNH), fl. July/Aug. — Tawitawi, Sulu province: *Ramos & Edano 43986* (L, PNH), fl. July/Aug. — Negros: *Curran 17456* (L, PNH), fl. Sept. — Sibuyan: *Franco 18834* (L, PNH), fl. — without loc. *Cumming: 2265* (L), fl.

Moluccas — Halmahera, Wede, Buku Swolendi: *N.I.F.S. bb 24921* (BZ, L), fl. fr. May — Sula, Mangoli: *N.I.F.S. bb 29809* (BZ, L), Oct.; Sanana, Wai Tobukoh, *N.I.F.S. bb 28793* (BZ, L), Aug. — Ceram: *de Vriese & Teysmann s.n.* (L); Wahai, Salika: *N.I.F.S. 23040* (BZ, L), July — without loc.: *Forster s.n.* (L), July.

Lesser Sunda Isl. — Lombok, Belurung: *N.I.F.S. bb 23327* (BZ, L), fl. — Flores, Solor Isl. near Watuwiti: *N.I.F.S. bb 15964* (BZ, L), Sept. — Timor, Kupang: *de Vriese & Teysmann s.n.* (L), fl.

New Guinea — Manokwari, Warnapi: *Kostermans 424 (= N.I.F.S. bb 33590)* (BZ, L); Kaimana: *Lundquist 608* (BZ, L), fr. June; ibidem: *Lundquist 192* (BZ,L), fl. June; Coast between Oriomo and Fly river: *Brass 6460* (A, L), fl. fr. April; Tarara, Wassi Kussa riv.: *Brass 8550* (A, L), fl. fr. Dec.; Port Moresby: *Carr 11835* (L), fl. April; ibidem: *Carr 11836* (L), fr. April — Daru Isl.: *Brass 6282* (A, L), fr. March — Misool, Waigama: *Eykman Inst. s.n.* (BZ, L), Dec.

Solomon Isl. — N'Gela Isl.: *Brass 3512* (A, L), fl. fr. Jan. — Ysabel Isl., Maringe: *Brass 3297* (BZ, L), fl. Dec.

Distribution: India to Hawaii, Northern Australia and New Caledonia.

NOTE: Read for BZ: BO

REVIEWS.

Flora Malesiana, Vol. I.

With reference to and in continuation of our elaborate announcement in Blumea VI, nr. 2, 1950, p. 544—545, it is a pleasure to report now the publication of Vol. I, entitled: *Malaysian plant collectors and collections, being a cyclopaedia of botanical exploration in Malaysia and a guide to the concerned literature up to the year 1950* by Mrs. M. J. van Steenis—Kruseman (CLII + 639 pp., 3 maps and about 220 illustrations).

The General Part (roman page numbers) comprises introductory paragraphs (aim of work, interesting data and hints on labeling, lists of illustrations and literature of use to collectors and investigators, terminology of altitudinal zones, and the use of vernacular names) as well as chapters on the technique of botanical exploration and collecting, on the phytogeographical delimitation and subdivision of Malaysia, on the collections made in the area concerned (arranged both chronologically and geographically, with 1 map), statistics of collections and desiderata for further exploration with 2 maps), sources consulted for the data mentioned (literature and herbaria), and samples of handwritings of 70 collectors and botanists.

The Special Part consists of an alphabetical list of more than 3000 collectors, many (about 180) adorned with portraits of which several never have been published before; each entry gives, as far as possible, a concise biography and detailed particulars on the trips made, their collections and main publications.

An Index on geographical names, expeditions etc., and persons not mentioned in the main list is a valuable addition and key.

It is our impression that this book, which is the result of many years of painstaking work, has been very accurately prepared and I know that both Dr and Mrs Van Steenis never permitted themselves to be satisfied with data, even seemingly minor ones, unless they had checked them up themselves as far as the original sources were available to them. This makes the work as trustworthy as may be reasonably expected of human achievements. The work is simply unique and will doubtless prove to be an unfailing source of information for many years to come. In a certain way, it concludes a period and we may therefore safely assume that a carefully conceived work like this will never surpassed.

The volume is well-edited by Noordhoff-Kolff Ltd., Djakarta; printers are the renowned Joh. Enschedé & Sons, Haarlem. The price, bound in cloth, is Hfl. 55.—.

H. J. LAM.

Taylor, William Randolph, Plants of Bikini and other Northern Marshall Islands, University of Michigan Studies, Scientific Series Vol. XVIII — The University of Michigan Press, Ann Arbor, 1950, XV + 227 pp., 79 black plates and 1 coloured plate, $ 5.50.

The four atolls studied here have been rarely visited and probably will not be visited again in a near future. Moreover, this was the first time that the flora of the Northern Marshall Islands has been studied thoroughly and since this was done by an energetic and able student of marine Algae, it is only natural that the greatest stress has fallen on the seaweeds. Though the littoral marine flora is rather poor — certain common tropical Algae are wanting — the vegetation of the bottom of the lagunes appeared to be rich in Algae. After having described the algal flora of the reefs and the lagunes, the author enumerates the collected species, adding to each species detailed notes about the habitats. Larger genera have been elucidated with a key down to the formae, such as the ecologically interesting genus *Halimeda* which, like *Lithothamnion* and allied genera, is very important for reefbuilding, *Caulerpa* with its variable species, and *Liagora*. Instructive information about the special technique in studying *Halimeda* has been added.

The *Myxophyceae*, among which a number of interesting species, have been studied by Dr Fr. Drouet. He changed the names of some common species on nomenclatural grounds, after study of types.

Only few *Fungi* and *Lichens* and only one *Bryophyte* have been found. Prof. Taylor has described 13 new species and 5 new formae of Algae, and Prof. L. E. Wehmeyer 1 new Fungus. We feel sorry for the fate of those new species which have been found at Bikini only and we can only hope that they either survived the atom bomb destruction or will be eventually found on other atolls as well.

The porous and poor calciferous soil bears a fairly small number of Spermatophytic species. These only cover some 40 pages and 16 plates and there are no new species. Identifications were made or checked by various experts amongst whom Prof. H. H. Bartlett, Mrs. A. Chase, Dr H. St. John, Dr J. P. Swallen, Dr F. R. Fosberg, and Dr R. McVaugh. Only two specimens could not be named beyond the genus (*Pandanus* and *Caesalpinia*) and most belong to wide spread species. Mention has been made of 56 species in all, of which 13 grasses, the others belonging to 30 different families.

To all species more or less elaborate descriptions, but no synonymous and no literature have been added, which render it impossible to check names. This is partly compensated by the bibliography given at the end of the book. Likewise it is regrettable that no mention has been made of the distribution.

A remarkable feature is the forest of high specimens of *Pisonia grandis* R. Br. in the central parts of the larger islands.

Cocos nucifera was found only in a cultivated state and does not seem to establish itself independently. Specimens manifestly growing from nuts washed ashore were always found "depauperate". This is a remarkable statement. On account of it, it would seem of importance to investigate this problem all over the Pacific area in order to state where the coconut-tree, which is considered being of Malaysian or Pacific origin, is evidently planted or grown by man and where it is spontaneous.

Among the 147 excellent photographs there are 2 splendid coloured ones. Together with 4 maps they provide the book with ample illustration, showing one vegetation, separate plants and structural details of *Corallinaceae*. In a single case, like *Pocockiella papenfusii* n. sp., detailed drawings might have been more enlightening. An Index facilitates the use of this well-edited work which we wish in the hands of all botanists working on the Pacific flora or merely in love with that remarkable region.

JOSÉPHINE TH. KOSTER and H. J. LAM.

Dr. G. Huber-Pestalozzi, Das Phytoplankton des Süsswassers, Systematik und Biologie, Teil 3 — Prof. Dr. A. Thienemann, Die Binnengewässer, Einzeldarstellungen aus der Limnologie und ihren Nachbargebieten, Band XVI, 3. Teil — E. Schweizerbart'sche Verlagsbuchhandlung (Erwin Nägele), Stuttgart, 1950, 16.5 × 25 cm., 310 pp., 350 fig. on 69 plates and in the text; paper bound DM 67.—, cloth DM 70.—.

The third part of Volume XVI of the well-known series of monographs concerning the freshwater hydrobiology gives a review of the classes *Cryptophyceae*, *Peridineae* (*Dinophyceae*) and *Chloromonadinae*, all unicellular *Algae*, provided with 2 (rarely 1) flagellae. In imitation of Pascher the first classes are combined in the *Pyrrophyta*, but also the last class is brought to the same division.

Here 236 species, 35 varieties and 67 formae have been described in a clear and ample way and nearly all of them have been illustrated. In total there are 1415 drawings, most of which are very good, especially those of the *Peridineae*. Biological and ecological data, taxonomic and phylogenetic speculations and critical remarks render the book most valuable. Some new taxa have been created. However, the new species of *Amphidinium*, since a latin diagnosis is wanting, is not validly published in the sense of the International Rules of Nomenclature (art. 38), even though figures are added (art. 43 and 44). According to the same rules it is not allowed to change the specific epithet of *Amphidinium amphidinioides* (Geitler) Schiller only because it does not sound well and is a pleonasm (art. 59).

The keys enhance the usefulness of the work considerably. It is a pity that the author postpones the enumeration of the used literature to the final part of Volume XVI, the more so as no citations of literature have been added to the descriptions of the species.

The great value of this work is not only caused by the numerous data concerning these difficult classes, but also by the results of the author's own investigations which are incorporated.

The book is conveniently arranged and printed on good paper, the plates even on firmer paper.

JOSÉPHINE TH. KOSTER.

Dr A. W. KLOOS †

Just as the present number was about to be taken from the press, the sad news of KLOOS' death reached us. He died in his home on June 3rd, 1952, after an illness of several months.

A biographic note will appear in the next issue of Blumea.

The Editor.

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to Vol. VI

compiled by

H. J. VAN HATTUM

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